Santa Clara Valley
Water District

Annual
Groundwater Report

for Calendar Year 2012

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EXECUTIVE SUMMARY

This annual Groundwater Report describes groundwater conditions in the Santa Clara and Llagas Subbasins in Santa Clara County for calendar year 2012. The report includes information on groundwater use, levels, storage, land subsidence, and water quality (both groundwater and water used for managed recharge). This report also describes the District's groundwater management activities in 2012 and evaluates recent data per the outcome measures identified in the District's Groundwater Management Plan (GWMP)[1]. These outcome measures are used to evaluate performance in meeting **Board Water Supply Objective 2.1.1: "Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion."**

Groundwater conditions were generally good in 2012. Water levels were well above historical lows at index wells and groundwater storage was adequate despite dry conditions most of the year. Pumping was slightly higher than 2011 but has decreased by over 10% over the last five years. Groundwater quality remains very good with the exception of nitrate in South County.

In 2012, nearly 40 percent of the water used in the county was pumped from groundwater. To augment groundwater supplies, the District replenished the groundwater subbasins with nearly 97,000 acre-feet (AF) of local and imported water. In-lieu recharge programs, including the provision of treated water and countywide recycled water and water conservation programs, reduced demands on groundwater by over 209,000 AF. Table ES-1 shows data for key indicators in 2012 as compared to 2011 and the last five years (2007 to 2011).

Monitoring at the Los Gatos, Penitencia, Lower Llagas, and Upper Llagas recharge systems indicates that recharge water quality is generally very good and is typically similar to or better than the underlying groundwater quality. The managed recharge systems sampled do not appear to be impacted by salinity, runoff, or trace metals.

Outcome measures related to groundwater storage, land subsidence, agricultural water quality objectives, and water quality trends for nitrate and total dissolved solids were met, and the outcome measure for chloride trends was nearly met. The water quality outcome measure related to drinking water standards in water supply wells was not met due to elevated nitrate. A summary of outcome measure performance is provided in Table ES-2, which also indicates recommended actions to address measures not being met.

If dry conditions persist, it is expected that groundwater levels and storage will decline. Groundwater storage is the county's best local protection against droughts or water supply outages and has been critical in helping to meet the county's water supply needs during dry years such as 2013. The District will continue to conduct managed recharge operations and reduce demands on groundwater through treated water, water conservation, and recycling programs to ensure adequate groundwater supplies are available. The District will actively monitor groundwater levels, land subsidence, and water quality to support operational decisions and ensure groundwater resources are protected. The District will also continue to track proposed legislation, policies, and regulatory standards that may impact groundwater resources or the District's ability to manage them. For example, the District will closely follow regulatory developments related to chromium-6 including the expected release of a draft drinking water standard in August 2013.

The GWMP will be reviewed and updated as needed every five years to ensure current information on local groundwater management is available to support the five-year updates of Urban Water Management Plans

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[1] Santa Clara Valley Water District, Groundwater Management Plan, July 2012.

(UWMPs). As the next District UWMP is scheduled to be completed in 2015, the next review of the GWMP will occur in calendar year 2014.

North County Groundwater Summary

Groundwater use in the North County was 76,300 AF in 2012. Pumping has generally decreased over the last five years as the use of treated water has increased. Pumping patterns have remained relatively stable in terms of location and use, with nearly all groundwater used for municipal and industrial (M&I) purposes. Groundwater levels were similar to or slightly lower than 2011 levels and were well above historical lows and thresholds established to minimize the risk of land subsidence. The projected end of 2013 total groundwater storage is 302,000 AF in the Santa Clara Plain, which meets the outcome measure.

Groundwater in the North County is generally of very high quality. In 2012, 99% of all water supply wells tested did not have any results above health-based drinking water standards. The only exception was a detection of natural fluoride above drinking water standards at one well. It is not uncommon to have a small number of wells with metals or ions above drinking water standards due to local geologic conditions.

South County Groundwater Conditions

In 2012, groundwater pumping in the Coyote Valley and Llagas Subbasin was 11,600 AF and 43,200 AF, respectively. Pumping was generally similar to or slightly higher than 2011 and the last five years. The location and use of groundwater has remained relatively stable, with approximately equal M&I and agricultural pumping. There was also a small volume of domestic use reported from nearly 3,000 private wells in 2012.

In general, 2012 groundwater levels were slightly lower than 2011 levels due to semi-dry conditions but remained well above historical lows at index wells. The projected end of 2013 groundwater storage is 8,000 AF in the Coyote Valley and 28,000 AF in the Llagas Subbasin, which meet the related outcome measures. Although the targets are currently being met, total South County storage is projected to decrease by over 13,000 AF between 2012 and 2013, and it may be a challenge to continue to meet the outcome measure if dry conditions continue into the winter and spring.

Groundwater quality in South County is generally good with the exception of nitrate, which remains the primary groundwater protection challenge due to historic and ongoing sources. Nitrate was detected above the drinking water standard in about 30% of South County water supply wells tested in 2012 (primarily domestic wells). For this reason, the outcome measure related to drinking water standards was not met for 2012. The District continues to offer basic well testing (including nitrate) to eligible domestic well owners and is working with basin stakeholders to develop Salt and Nutrient Management Plans, which are expected to be completed in 2014. The District will also begin a rebate program for nitrate treatment systems for domestic wells with elevated nitrate in fiscal year 2014.

Table ES-1 2012 Groundwater Conditions as Compared to Other Indices

Index[1]	2012	Compared to 2011	Compared to Last 5 Years (2007 - 2011)
Managed Recharge	96,700 AF	Up 3%	Up 2%
Groundwater Pumping	131,100 AF	Up 7%	Down 13%
Groundwater Levels[2]			
Santa Clara Plain	73.86 feet	Down 8%	Up 1%
Coyote Valley	261.36 feet	Down 2%	Down 2%
Llagas	208.17 feet	Down 10%	Down 5%
End of Year Groundwater Storage	357,500 AF	Up 1%	--
Land Subsidence[3]	-0.001 feet/year (net uplift)	Same	--
Groundwater Quality[4]			
Santa Clara Plain - TDS	395	Similar[5]	Similar
Coyote Valley - TDS	358	Similar	Similar
Llagas - TDS	340	Similar	Similar
Santa Clara Plain – Nitrate	12.4	Similar	Similar
Coyote Valley – Nitrate	10.6	Similar	Similar
Llagas - Nitrate	24	Similar	Similar

Notes:

1) Groundwater levels and quality are shown for three groundwater management areas: the Santa Clara Plain and Coyote Valley (which are part of the Santa Clara Subbasin) and the Llagas Subbasin.
2) Groundwater elevations at index wells represent October levels, which are typically the lowest levels of the year. The five-year average comparison considers all groundwater elevation readings within the period.
3) The water level at all subsidence index wells was above established thresholds throughout 2012, indicating a low risk of permanent subsidence.
4) Values shown represent median groundwater quality in mg/L for all principal aquifer zone wells tested. Nitrate values shown are nitrate (as NO_3).
5) Individual wells sampled for TDS and nitrate vary each year so a numeric comparison of median values is not shown. “Similar” indicates that the regional median values were within 20 mg/L for TDS and 3 mg/L for nitrate.

Table ES-2 Summary of Outcome Measure Performance and Action Plan

Groundwater Storage	• **OM 2.1.1.a.** Greater than 278,000 AF of projected end of year groundwater storage in the Santa Clara Plain. Projected end of 2013 Storage: 302,000 AF • **OM 2.1.1.b.** Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley. Projected end of 2013 Storage: 8,000 AF • **OM 2.1.1.c.** Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin. Projected end of 2013 Storage: 28,000 AF
Groundwater Levels and Subsidence	• **OM 2.1.1.d.** 100% of subsidence index wells with groundwater levels above subsidence thresholds. All ten subsidence index wells had groundwater levels above thresholds in 2012.
Groundwater Quality	• **OM 2.1.1.e.** At least 95% of countywide water supply wells meet primary drinking water standards. 82% of countywide water supply wells tested in 2012 met primary drinking water standards due to elevated nitrate in South County (mainly in domestic wells). If nitrate is not included, 99% of water supply wells met primary drinking water standards. • **OM 2.1.1.f.** At least 90% of South County wells meet Basin Plan agricultural objectives. 95% of wells met agricultural objectives. **Action Plan for OM 2.1.1.e:** • Implement rebate program for point of use nitrate treatment systems for domestic wells with elevated nitrate beginning in fiscal year 2014. • Continue to work with basin stakeholders to develop Salt and Nutrient Management Plans to address nitrate loading.
Groundwater Quality Trends	• **OM 2.1.1.g.** At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids. 89% of wells had stable or decreasing concentrations of chloride. 93% of wells had stable or decreasing concentrations of nitrate. 97% of wells had stable or decreasing concentrations of total dissolved solids (TDS). **Action Plan for OM 2.1.1.g:** • Continue to work with basin stakeholders to develop Salt and Nutrient Management Plans to address salt loading.

1. INTRODUCTION

This section provides background information for this annual groundwater report, including the purpose and study area.

The Santa Clara Valley Water District (District) has the responsibility and authority to manage the Santa Clara and Llagas Subbasins in Santa Clara County per an act of the California legislature[2]. The District's objectives and authority related to groundwater management are to recharge groundwater basins, conserve, manage and store water for beneficial and useful purposes, increase water supply, protect surface water and groundwater from contamination, prevent waste or diminution of the District's water supply, and do any and every lawful act necessary to ensure sufficient water is available for present and future beneficial uses.

The District mission to protect groundwater resources is reflected in Water Supply Objective 2.1.1 adopted by the District Board: "Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion." In accordance with the District Act and Board policy, the following basin management objectives are identified in the District's Groundwater Management Plan (GWMP)[3]:

- Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.
- Groundwater is protected from existing and potential contamination, including salt water intrusion.

The GWMP also includes strategies to achieve those objectives and describes numerous programs and activities that support the basin management objectives. Outcome measures related to groundwater levels, storage, and quality are also identified to determine if the basin management objectives are being met. The GWMP will be reviewed and updated as needed every five years to ensure current information on local groundwater management is available to support the five-year updates of Urban Water Management Plans (UWMPs). As the next District UWMP is scheduled to be completed in 2015, the next review of the GWMP will occur in 2014.

Purpose

This annual Groundwater Report describes groundwater conditions in Santa Clara County for calendar year 2012. The report includes information on groundwater use, levels, storage, and quality, as well as land subsidence and the quality of water used for managed recharge. This report also describes the District's groundwater management activities in 2012 and evaluates recent data per the following outcome measures (OM), which are used to evaluate performance in meeting Board Water Supply Objective 2.1.1:

- OM 2.1.1.a. Greater than 278,000 AF of projected end of year groundwater storage in the Santa Clara Plain.
- OM 2.1.1.b. Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley.
- OM 2.1.1.c. Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin.
- OM 2.1.1.d. 100% of subsidence index wells with groundwater levels above subsidence thresholds.
- OM 2.1.1.e. At least 95% of countywide water supply wells meet primary drinking water standards.
- OM 2.1.1.f. At least 90% of South County wells meet Basin Plan agricultural objectives.
- OM 2.1.1.g. At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids.

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[2] Santa Clara Valley Water District Act, Water Code Appendix, Chapter 60.

[3] Santa Clara Valley Water District, Groundwater Management Plan, July 2012.

Study Area

This report presents information for the Santa Clara and Llagas Subbasins, which are identified by the California Department of Water Resources as Subbasins 2-9.02 and 3-3.01, respectively (Figure 1). Due to different land use and management characteristics, the District divides the Santa Clara Subbasin into two groundwater management areas: the Santa Clara Plain and the Coyote Valley. Both the Santa Clara and Llagas Subbasins are divided into confined and recharge areas. Within confined areas, laterally extensive low permeability clays and silts separate shallow and principal aquifers, with the latter defined as aquifer materials greater than 150 feet below ground surface.

Where available, information is provided for the Santa Clara Plain, Coyote Valley, and Llagas Subbasin. Some data is only currently available by groundwater charge zones W-2 (North County) and W-5 (South County), which are shown in Figure 2. Zone W-2 generally coincides with the Santa Clara Plain, while Zone W-5 generally coincides with the Coyote Valley and Llagas Subbasin.

Figure 1 Santa Clara County Groundwater Subbasins

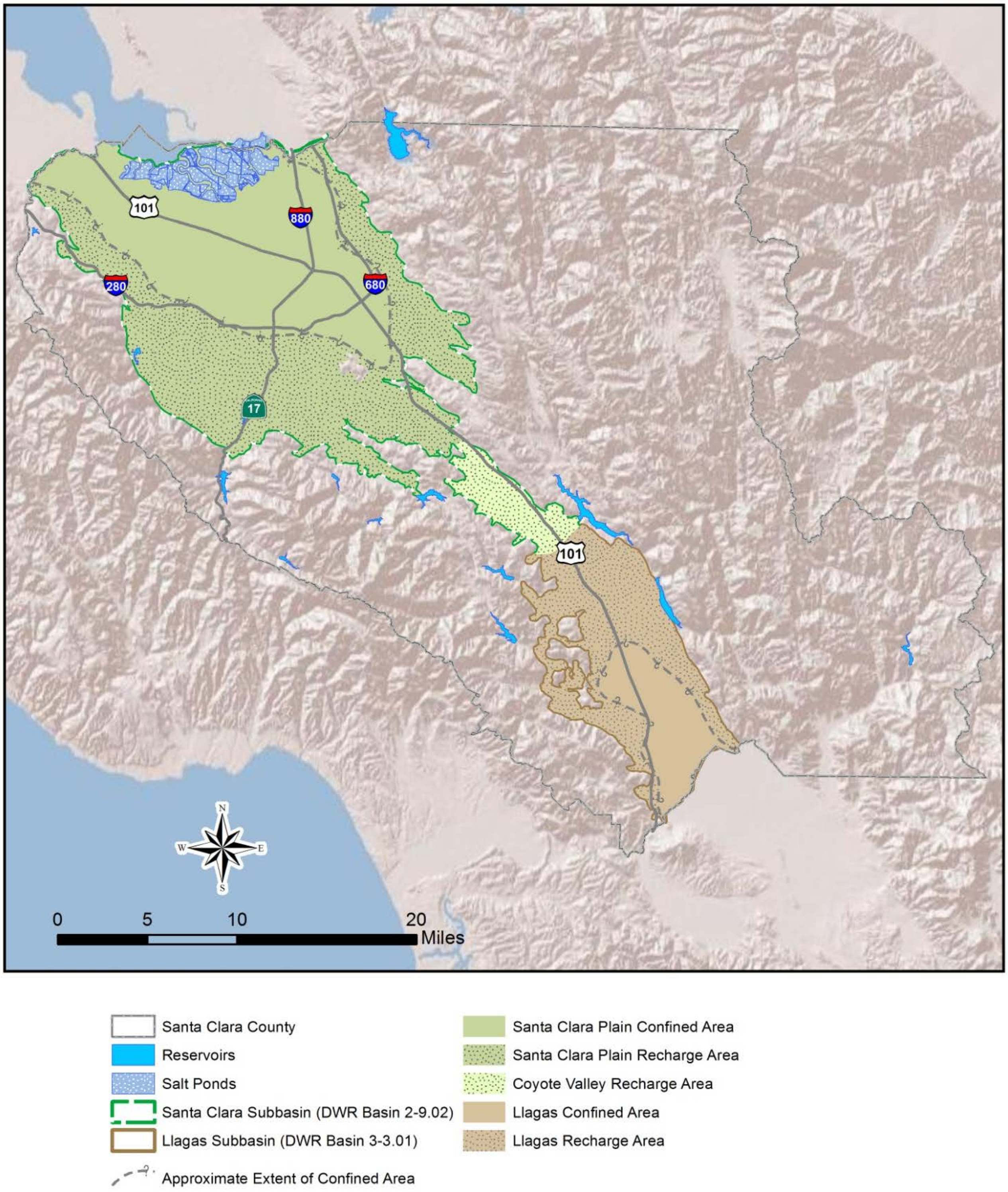
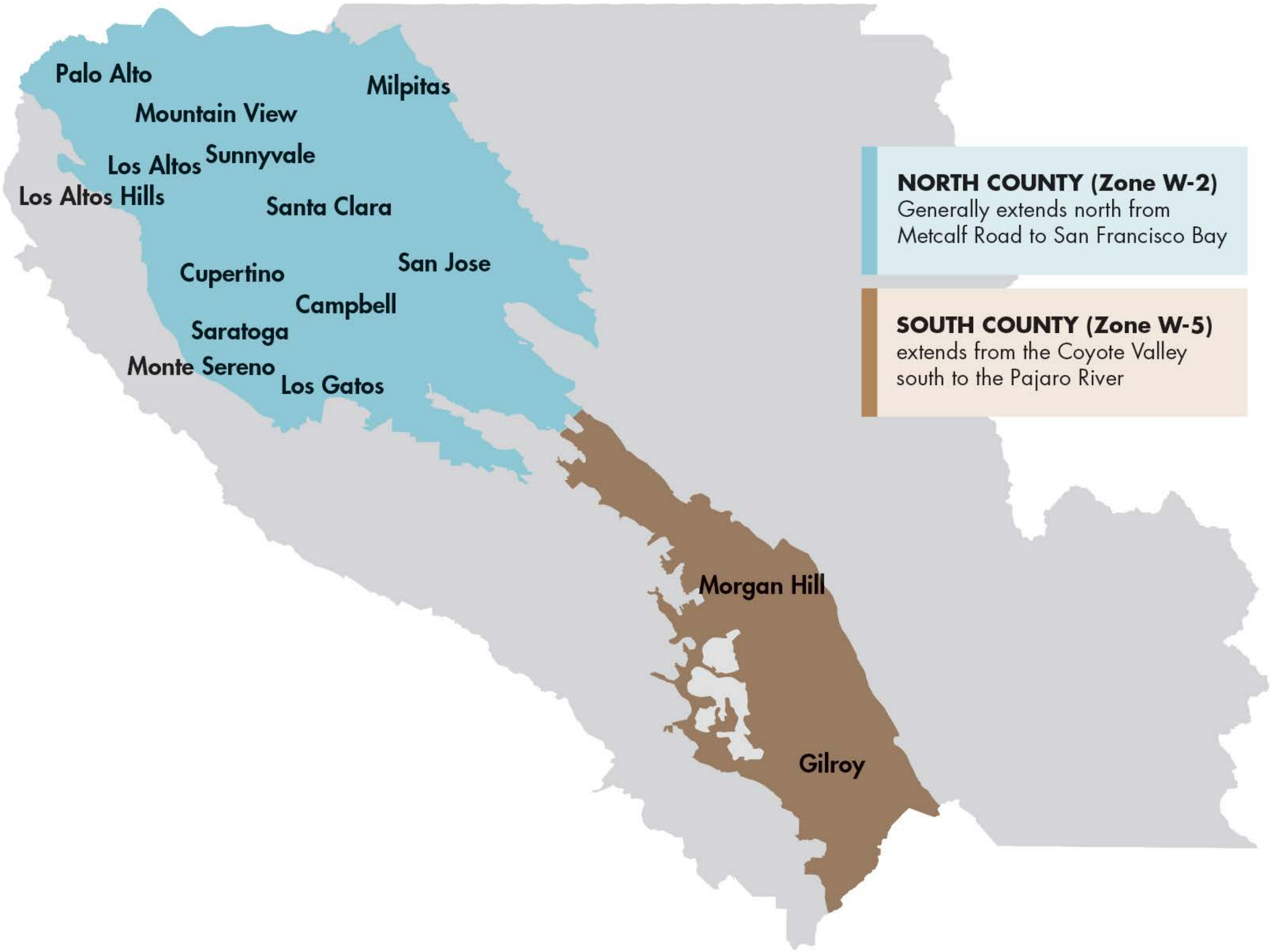

101
880
280
680
17
101
N
W
E
S
0
5
10
20
Miles
Santa Clara County
Reservoirs
Salt Ponds
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Approximate Extent of Confined Area
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

Figure 2 Groundwater Charge Zones


Palo Alto
Milpitas
Mountain View
Los Altos
Sunnyvale
Los Altos Hills
Santa Clara
San Jose
Cupertino
Campbell
Saratoga
Monte Sereno
Los Gatos
Morgan Hill
Gilroy
NORTH COUNTY (Zone W-2)
Generally extends north from Metcalf Road to San Francisco Bay
SOUTH COUNTY (Zone W-5)
extends from the Coyote Valley south to the Pajaro River

2. 2012 GROUNDWATER MANAGEMENT ACTIVITIES

In 2012, nearly 40 percent of the water used by the county's residents and businesses was pumped from groundwater. This section describes the major activities undertaken by the District in 2012 to manage groundwater as part of a comprehensive water supply system and protect groundwater quality.

The District replenished the groundwater subbasins with nearly 97,000 acre-feet (AF) of local and imported water. In-lieu recharge programs, including the provision of treated water and countywide recycled water and water conservation programs, reduced demands on groundwater by over 209,000 AF. To protect groundwater quality, the District inspected over 1,300 wells, conducted extensive monitoring, and implemented other programs as described in this section.

Managed Recharge

The District uses imported water and runoff captured in local reservoirs to replenish the groundwater subbasins so that adequate groundwater supplies are available for well owners. Local sources include the 10 reservoirs in Santa Clara County and imported water sources include the Federal Central Valley Project (CVP) and the State Water Project (SWP). District managed recharge facilities include recharge ponds and creeks as shown in Figure 3. In 2012, the District recharged about 96,700 acre-feet (AF) of local and imported water. As shown in Table 1, the majority of managed recharge occurred through in-stream recharge facilities, with over 70% of local and imported water used for recharge replenishing groundwater through creeks.

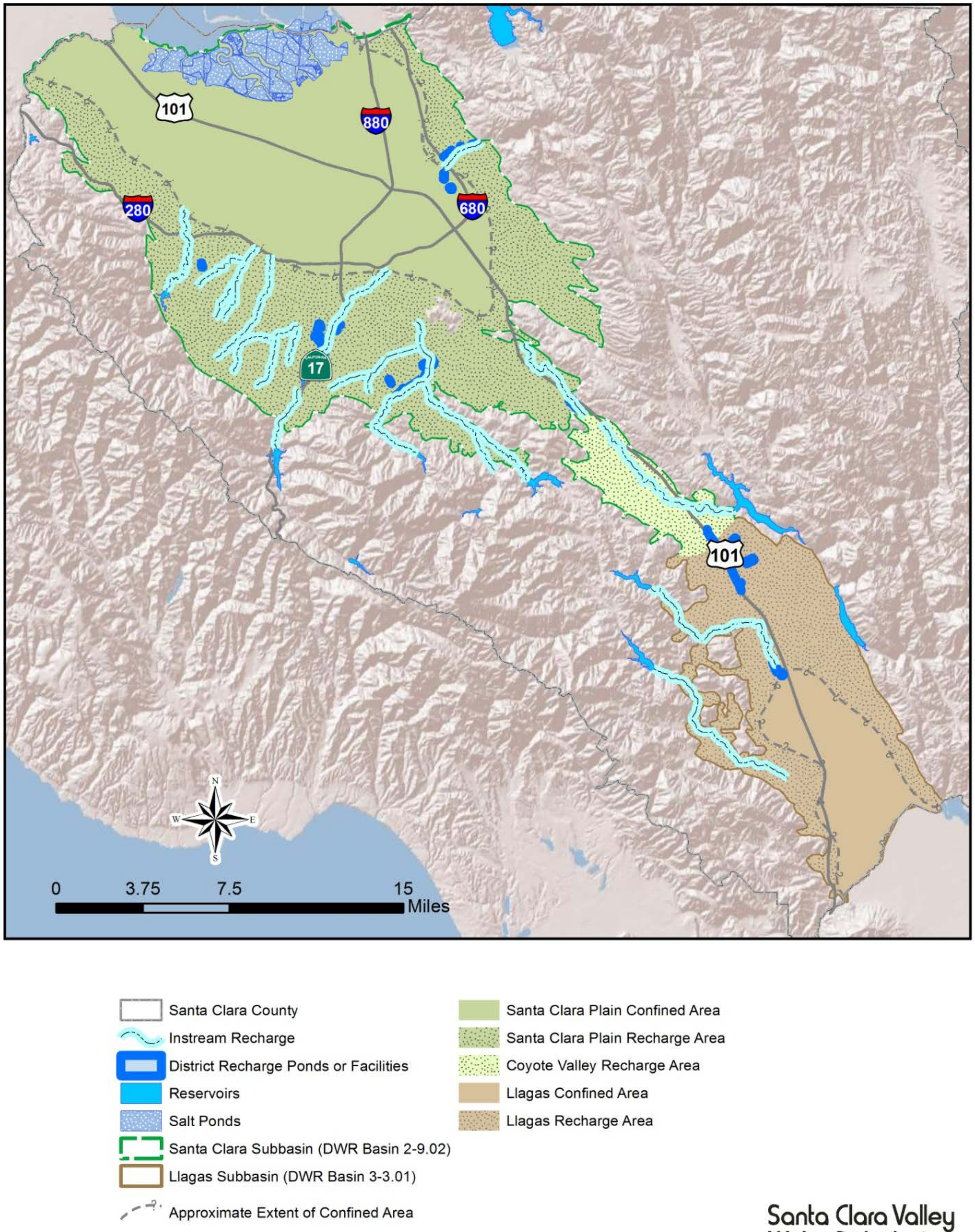
Table 1 Managed Recharge Summary for 2012 (AF)

	In-Stream Recharge (Creeks)	Off-Stream Recharge (Recharge Ponds)	Total
Zone W-2 North County	31,600	24,300	55,900
Zone W-5 South County	37,700	3,100	40,800
Total	**69,300**	**27,400**	**96,700**

In 2012, imported water was the source for over 60% of the managed recharge in North County, while the percent of local and imported water used for managed recharge was approximately equal in South County. Figure 4 shows managed recharge by source for calendar years 2005 through 2012. The total managed recharge amount in 2012 was similar to 2011 for both North and South County, but the amount of imported water used for recharge increased significantly in 2012. The use of imported or local water for managed recharge depends on a number of factors including hydrology, imported water allocations, treatment plant demands, and environmental needs. In general, a greater percentage of local water is used for recharge in wet years due to increased storage in local reservoirs.

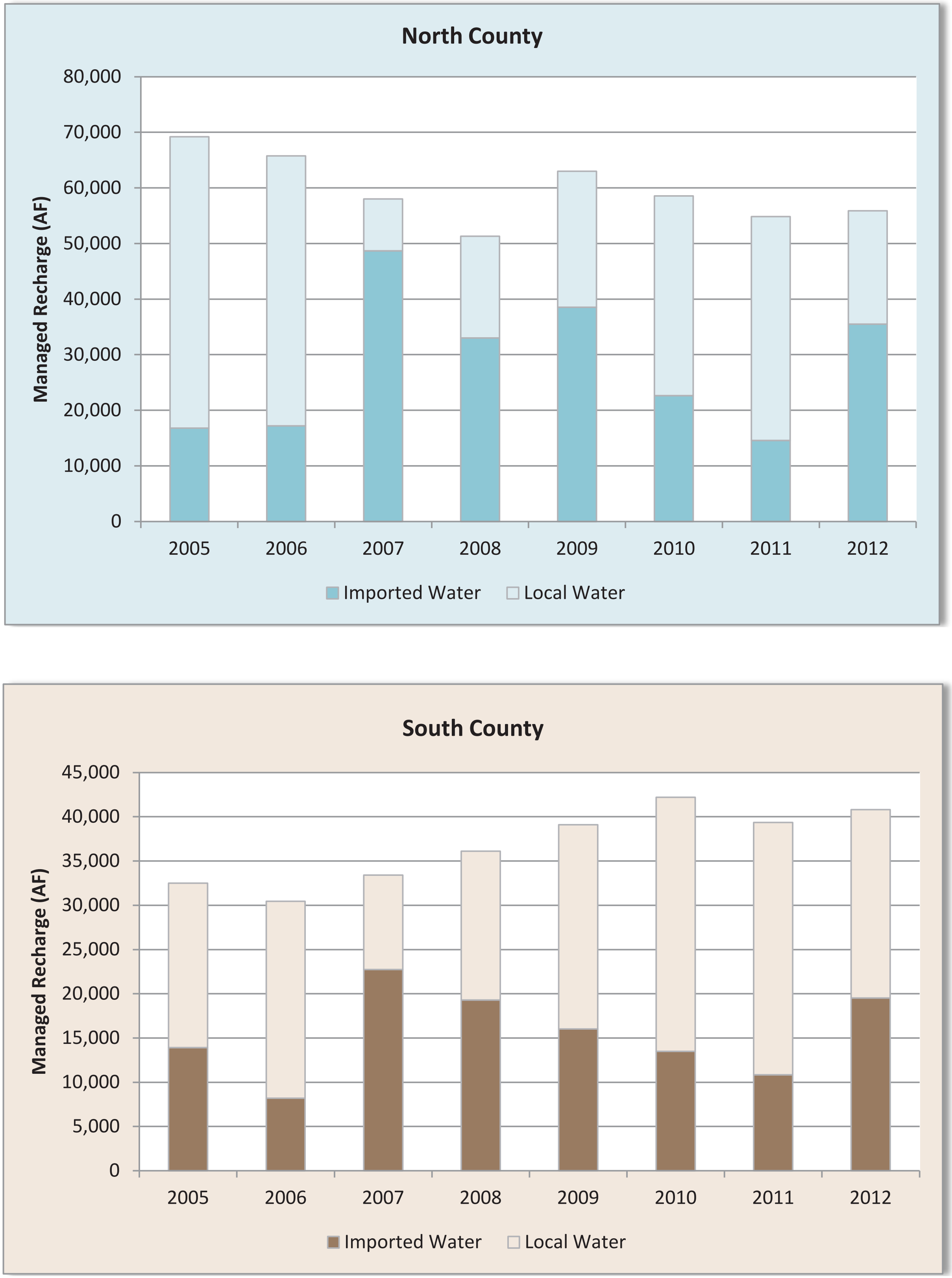
Operating restrictions have been imposed on several District reservoirs while seismic stability is analyzed, limiting the amount of local water that can be stored for groundwater recharge. Major capital projects over the next five years include the Anderson Dam Seismic Retrofit Project ($170 million) and the Calero and Guadalupe Dams Seismic Retrofits ($79 million).

Figure 3 District Managed Recharge Facilities


101
880
280
680
17
101
N
W
E
S
0
3.75
7.5
15
Miles
Santa Clara County
Instream Recharge
District Recharge Ponds or Facilities
Reservoirs
Salt Ponds
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Approximate Extent of Confined Area
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

Santa Clara Valley
Water District

Figure 4 Managed Recharge by Source (AF)



In-Lieu Recharge

The District's treated water sales and water conservation and recycling programs played a critical role in maintaining groundwater storage by meeting water demand that would have otherwise been met by groundwater. In 2012, treated water and recycled water provided about 136,300 and 17,600 acre-feet of water, respectively. The District's water conservation programs also saved approximately 55,400 acre-feet of water in 2012[4].

In the fall of 2013, the District's Silicon Valley Advanced Water Purification Center will come online. This state-of-the-art facility in San José will produce up to eight million gallons of highly purified water a year, by treating wastewater with microfiltration, reverse osmosis and ultraviolet light. This facility supports the expanded use of recycled water which will reduce the demand on groundwater.

Groundwater Monitoring

The District conducts extensive monitoring to assess groundwater elevations, groundwater quality, recharge water quality, and land subsidence. In 2012, the District:

- collected water level measurements from 219 wells,
- tested groundwater quality at 340 wells, including 239 domestic wells,
- measured land subsidence at 146 benchmarks and two extensometers,
- monitored recharge water quality at 24 locations, and
- monitored groundwater quality at 11 wells near recycled water irrigation sites.

In addition to directly collecting data, the District also evaluated water level data for 77 wells and water quality data for over 225 wells from local water suppliers. The water level data is obtained directly from water retailers while the water quality data is available from the California Department of Public Health (CDPH). A summary of all 2012 groundwater monitoring data is presented in subsequent sections of this report.

Well Ordinance Program

The District well ordinance program serves to ensure that wells and other deep excavations are properly constructed, maintained, and destroyed so they will not allow the vertical transport of waters of poor quality into deeper aquifers used for drinking water. The District issued over 1,500 well permits in 2012, primarily for well destruction and monitoring well construction. The District also inspected over 1,300 wells to ensure they were properly constructed and destroyed (Table 2).

In May 2012, the District Board established a well permit fee schedule for the first time. The fee schedule was effective on July 1, 2012. The permit fees were established to cover the costs associated with well permitting and inspection activities, so that these costs are no longer borne by the District's water rate payers.

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[4] Santa Clara Valley Water District, FY 2013-14 Protection and Augmentation of Water Supplies, February 2013.

Table 2 Well Permit and Inspection Summary for 2012

Permit Type	Number Processed
Well Construction - Water Producing Wells	64
Well Construction - Monitoring Wells	500
Well Destruction	750
Exploratory Boring	214
Total	**1,528**
Inspection Type	**Number Inspected**
Well Construction - Water Producing Wells	51
Well Construction - Monitoring Wells	342
Well Destruction	662
Exploratory Boring	249
Total	**1,304**

Salt and Nutrient Management Plans

In 2009, the State Water Resources Control Board (State Board) adopted a policy for water quality control for recycled water (Resolution 2009-0011) that included a requirement to develop regional Salt and Nutrient Management Plans (SNMPs). The SNMPs address salt and nutrient loading to groundwater subbasins that may arise from use of recycled water, agricultural activity, and all other sources, and evaluate the overall salt balance in the groundwater subbasins.

The District is working with local stakeholders to develop SNMPs for the Santa Clara Subbasin (in coordination with the San Francisco Bay Water Board) and the Llagas Subbasin (in coordination with the Central Coast Water Board). The plans are expected to be completed in 2014 and will include: salt and nutrient source identification, loading and assimilative capacity estimates, water recycling and stormwater recharge/reuse goals and objectives, implementation measures, a groundwater monitoring plan, and an anti-degradation analysis.

Coordination with Land Use and Regulatory Agencies

Contaminant release sites

There are nearly 500 open cases where non-fuel contaminants have been released to soil and/or groundwater in the county. There are also over 250 open fuel leak sites and 25 Superfund sites. Due to the large number of open cases, District staff prioritizes which cases are closely tracked. Currently, staff closely monitors progress on 9 cases considered to be of high priority due to a higher threat to groundwater resources. These sites were chosen based on several factors, including the vulnerability of groundwater, proximity to water supply wells or surface water, and contaminant concentration.

On a quarterly basis, District staff reviews monitoring and progress reports submitted to the regulatory agencies by the responsible parties, as well as any regulatory orders or correspondence. District staff works with the regulatory agencies to promote thorough and expedited cleanup on these cases. The District also provides technical review of other contaminant release sites as requested by regulatory agencies. The District's review of the high threat cases and interactions with regulatory agencies are documented in a semi-annual summary[5].

Policy and Legislation Review

The District reviews proposed legislation and policies (both statewide and local) to ensure the county's water resources and the District's ability to manage them are protected. The most notable legislation proposed in 2012 with regard to groundwater was AB 2398 which included significant changes to the Porter-Cologne Water Quality Act, which governs the protection of water resources. Over several iterations of the bill, the District provided extensive comments and recommended amendments to ensure the protection of groundwater quality would not be weakened. Due to the concerns raised by the District and others, AB 2398 was withdrawn from consideration.

The most significant state policy change with regard to groundwater was the State Board's adoption of a low-threat closure policy for underground storage tanks. The District and other water agencies expressed concerns over the proposed policy, including the potential for the closure of cases with remaining contamination several orders of magnitude above drinking water standards and the lack of consideration for local conditions due to prescribed conditions for closure. Although the District and other agencies provided written comments and testimony at a public hearing, the policy was adopted by the State Board in May 2012 (Resolution 2012-0016). The adopted policy contains fixed, numeric criteria to define and close underground storage tank cases and is now being implemented statewide.

Another significant policy adopted in 2012 relates to discharges from irrigated lands in the Central Coast Region, which includes the Llagas Subbasin. In March 2012, the Central Coast Water Board adopted the Conditional Waiver of Waste Discharge Requirements for discharges from irrigated lands (Order R3-2012-0011), also known as the Agricultural Order (Order). The Order regulates landowners and operators of irrigated lands where water is applied for producing commercial crops, from which runoff could affect water quality. Growers are categorized in tiers, based on the risk their farm poses to groundwater and surface water. Growers must implement related monitoring and reporting requirements, and farms posing a lower threat to water quality have fewer requirements. The Order encourages and provides incentives for cooperative water quality improvement efforts to reduce costs and maximize effectiveness. Several agencies in Santa Clara County are working cooperatively to meet the Order requirements, including the Grower-Shipper Association and the Santa Clara County Farm Bureau, and staff from the District and Monterey County Resources Agency have participated in these meetings.

Land Use Review

There are numerous threats to groundwater in the county including urban runoff, industrial chemical releases, inefficient agricultural practices, and leaking underground storage tanks. Of particular concern are potentially contaminating activities over groundwater recharge areas, which are more vulnerable to contamination due to more permeable soils and higher groundwater flow rates. Land use decisions fall under the authority of the local cities and the County. The District reviews some local land use and development plans to identify threats to District facilities, groundwater, and watercourses under District jurisdiction.

In 2012, the District provided groundwater-related comments on several land use proposals, including the Permanente Quarry Reclamation Plan. The District also participated in a Wastewater Advisory Group assembled by the County to assist with the review and update of the ordinance regulating onsite wastewater treatment systems. For all land use reviews, the District comments focus on specific actions (such as groundwater monitoring or analysis) to ensure groundwater resources are adequately protected.

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[5] Santa Clara Valley Water District, High Priority Point Source Release Case Review Fiscal Year 2013, Quarter 3, March 2013.

CASGEM

In 2009, the Governor signed SBX7 6, which established the California Statewide Groundwater Elevation Monitoring (CASGEM) program under DWR. The law requires that statewide groundwater level monitoring be implemented to determine seasonal and long-term trends in groundwater elevations. Local agencies may take on the responsibility for data collection and reporting to DWR. The District was formally designated as the monitoring entity for the Santa Clara County by DWR in July 2011. In 2012, District staff uploaded quarterly monitoring data directly to DWR's CASGEM website for 106 District-owned monitoring wells.

Public Outreach

Public outreach is an important component of the District's groundwater protection efforts. To help keep the public informed about current groundwater and water supply conditions, the District prepares monthly Water Tracker reports that are posted on the District website[6]. The District also posts monthly groundwater condition reports that contain more detailed on groundwater pumping, recharge, and water levels.

Because groundwater is far removed from the public's view, it can be a challenge to make the connection that actions occurring on the land surface can impact groundwater quality. In 2012, the District celebrated Groundwater Awareness Week (March 11-17) by adopting a Board resolution commemorating the week, highlighting groundwater on the District website, using social media messaging, and hosting an open house at the District headquarters. The City of San Jose also issued a proclamation to acknowledge Groundwater Awareness Week and the importance of groundwater resources.

The District also maintained its status as a Groundwater Guardian Affiliate through the Groundwater Guardian Program sponsored by the Groundwater Foundation, a non-profit organization. Groundwater Guardian is an annually earned designation for communities and affiliates that take voluntary, proactive steps toward groundwater protection. District activities include the school program (which reaches thousands of students each year), implementation of groundwater protection programs, and participation in workshops such as the Small Acreage Stewardship series. At this series, District staff presents targeted information on wells and water quality protection to well owners.

In 2012, the District developed the first Groundwater Quality Summary, which was mailed to all well owners in June. This provided information on sampling by the District and local water suppliers in 2011, and was similar in concept to consumer confidence reports provided by water retailers to their customers. The summary provided basic groundwater quality information to domestic well owners, who do not typically receive water from a water retailer. In June 2013, the District provided the summary of all 2012 groundwater quality data to well owners (Appendix A).

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[6] www.valleywater.org/WaterTracker.aspx

3. Groundwater Use

This section summarizes groundwater use in 2012, including the amount and location of pumping, use category (domestic, agricultural, and municipal and industrial), major users, and pumping trends.

In general, 2012 pumping was similar to or slightly higher than the previous year and the last five years, with the exception of the North County (Santa Clara Plain). Groundwater use in the North County has generally decreased over the last five years as the use of treated water has increased. Pumping patterns have remained relatively stable in terms of location and use (M&I, agricultural, or domestic).

Groundwater Pumping

Approximately 131,000 AF of groundwater was pumped in Santa Clara County in 2012. Table 3 shows groundwater pumping by groundwater zone, subbasin, and use category (including municipal and industrial (M&I), domestic, and agricultural uses). M&I users include water retailers and industrial users such as hospitals and golf courses.

Table 3 Groundwater Pumping in Calendar Year 2012 (AF)

Use Category	Zone W-2 North County	Zone W-5 South County		Total
	Santa Clara Plain	Coyote Valley	Llagas Subbasin	
Municipal & Industrial (M&I)	75,600	8,000	20,400	104,000
Domestic	500	100	1,300	1,900
Agricultural	200	3,500	21,500	25,200
Total	**76,300**	**11,600**	**43,200**	**131,100**

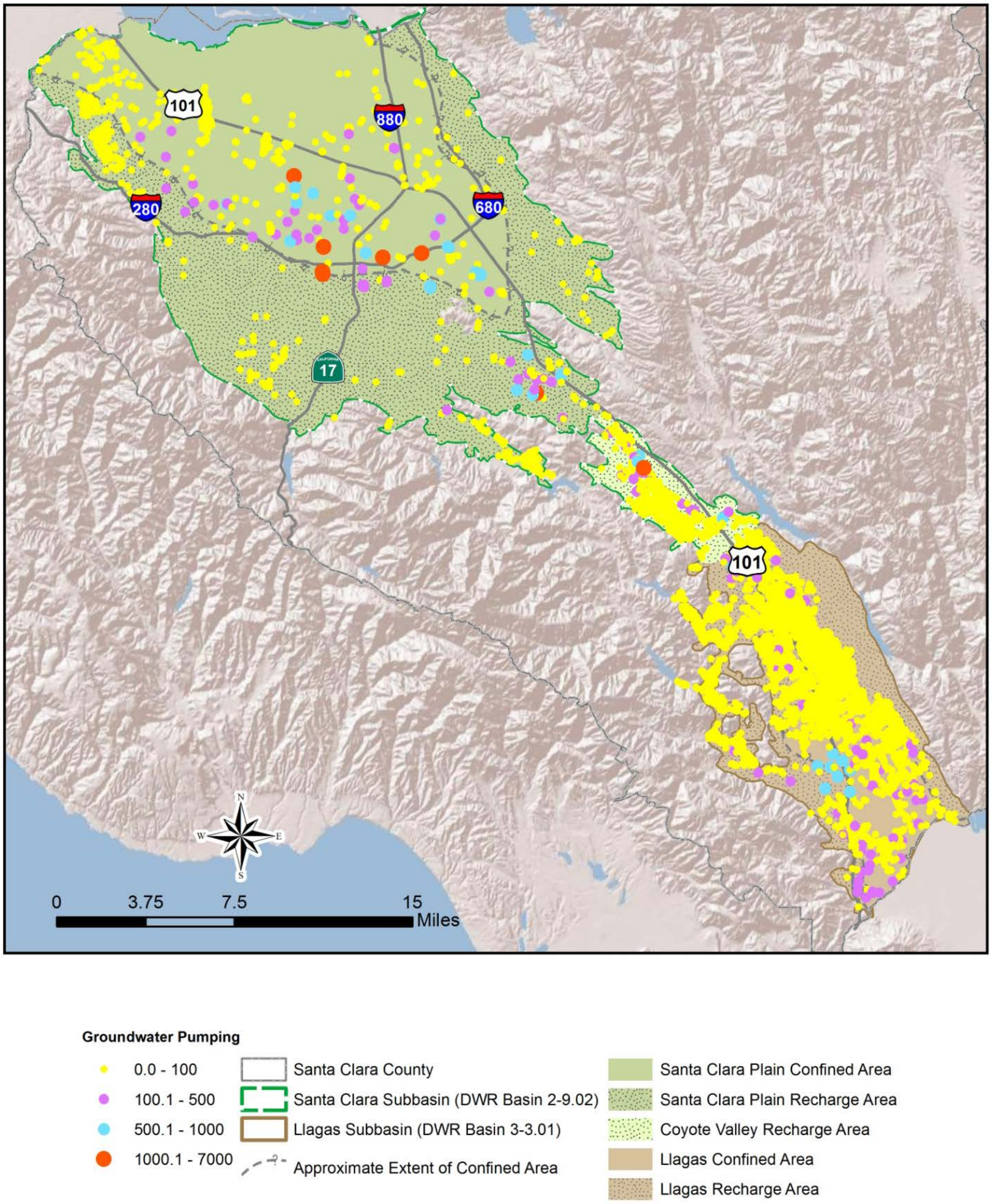
Groundwater pumping in the Santa Clara Plain (North County) is used primarily for M&I purposes, with minimal agricultural or domestic use. This is in contrast to the South County, where agricultural pumping is more significant, particularly in the Llagas Subbasin where it accounts for about half of all groundwater use. While the volume of domestic pumping is relatively small in the Coyote Valley and Llagas Subbasin, there are a large number of individual wells that reported groundwater use in 2012 (Table 4). The distribution of wells reporting groundwater use in 2012 is shown in Figure 5.

Table 4 Wells Reporting Groundwater Use in 2012

Use Category	Zone W-2 North County	Zone W-5 South County	
	Santa Clara Plain	Coyote Valley	Llagas Subbasin
Municipal & Industrial (M&I)	733	57	279
Domestic	381	318	2,628
Agricultural	48	93	567

Note: Some wells may report pumping for more than one use category (e.g., domestic and agricultural).

Figure 5 2012 Groundwater Pumping Distribution (AF)


101
880
280
680
17
101
N
W
E
S
0
3.75
7.5
15
Miles
Groundwater Pumping
0.0 - 100
100.1 - 500
500.1 - 1000
1000.1 - 7000
Santa Clara County
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Approximate Extent of Confined Area
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

Santa Clara Valley Water District

Groundwater pumping in the county is largely offset by the District's managed recharge of local and imported surface water as shown in Figure 6. Over the last 25 years, the annual managed recharge total averages 70% of the amount of groundwater pumped countywide.

Groundwater Pumping Trends

Groundwater pumping and use patterns over time are shown in Figure 7. In the Santa Clara Plain, a significant drop in groundwater pumping is noted in the late 1980s following completion of the District's third Water Treatment Plant (WTP), Santa Teresa. As intended, the availability of treated surface water from the three WTPs reduced groundwater demands to help protect the groundwater basin from overdraft and land subsidence. A notable increase in pumping in the Coyote Valley occurred in 2006, when a water retailer installed new wells and began extracting water to serve customers in other areas, resulting in a significant increase in M&I pumping. Aside from that change, pumping in the Coyote Valley and Llagas Subbasin has been fairly stable over the last few years as well as the period of record.

Recently, groundwater pumping in the Santa Clara Plain has declined as the use of treated water has increased. 2012 groundwater pumping was slightly higher than the previous year, but was about 18,000 acre-feet below the previous five-year average and was well below the long-term average (Table 5). Pumping in the Coyote Valley and Llagas Subbasin in 2012 was fairly similar to the previous year and the last five years. Figure 8 shows countywide water use by source for the last five years, including decreases in groundwater pumping that can mainly be attributed to increased treated water use in North County.

Table 5 Comparison of 2012 Groundwater Pumping to Other Indices (AF)

Groundwater Subbasin/Area	2012	2011	5 Year Average (2007-2011)	Period of Record (Average)
Santa Clara Subbasin, Santa Clara Plain	76,300	71,300	94,300	117,000
Santa Clara Subbasin, Coyote Valley	11,600	11,600	12,800	8,500
Llagas Subbasin	43,200	39,700	43,500	42,400
Total	**131,100**	**122,600**	**150,600**	**167,900**

Note: The period of record begins in 1981 for the Santa Clara Plain and in 1988 for the Coyote Valley and Llagas Subbasin.

Major Groundwater Users

Figure 9 shows the largest ten groundwater users in 2012 for North County and South County. Water retailers are the primary users in North County, accounting for nearly 90% of pumping within Zone W-2. San Jose Water Company is the largest individual user in North County, accounting for over half of all pumping. The list of the top ten pumpers also includes a few large industrial users and golf courses. In South County, the largest individual groundwater users are the cities of Gilroy and Morgan Hill, and water retailer pumping comprises about 40% of all water pumped within Zone W-5. Similar to North County, other large individual users include golf courses and industrial users. Unlike North County, the majority of pumping in South County is attributed to numerous smaller pumpers including agricultural and domestic users.

Figure 6 Countywide Groundwater Pumping and Managed Recharge (AF)

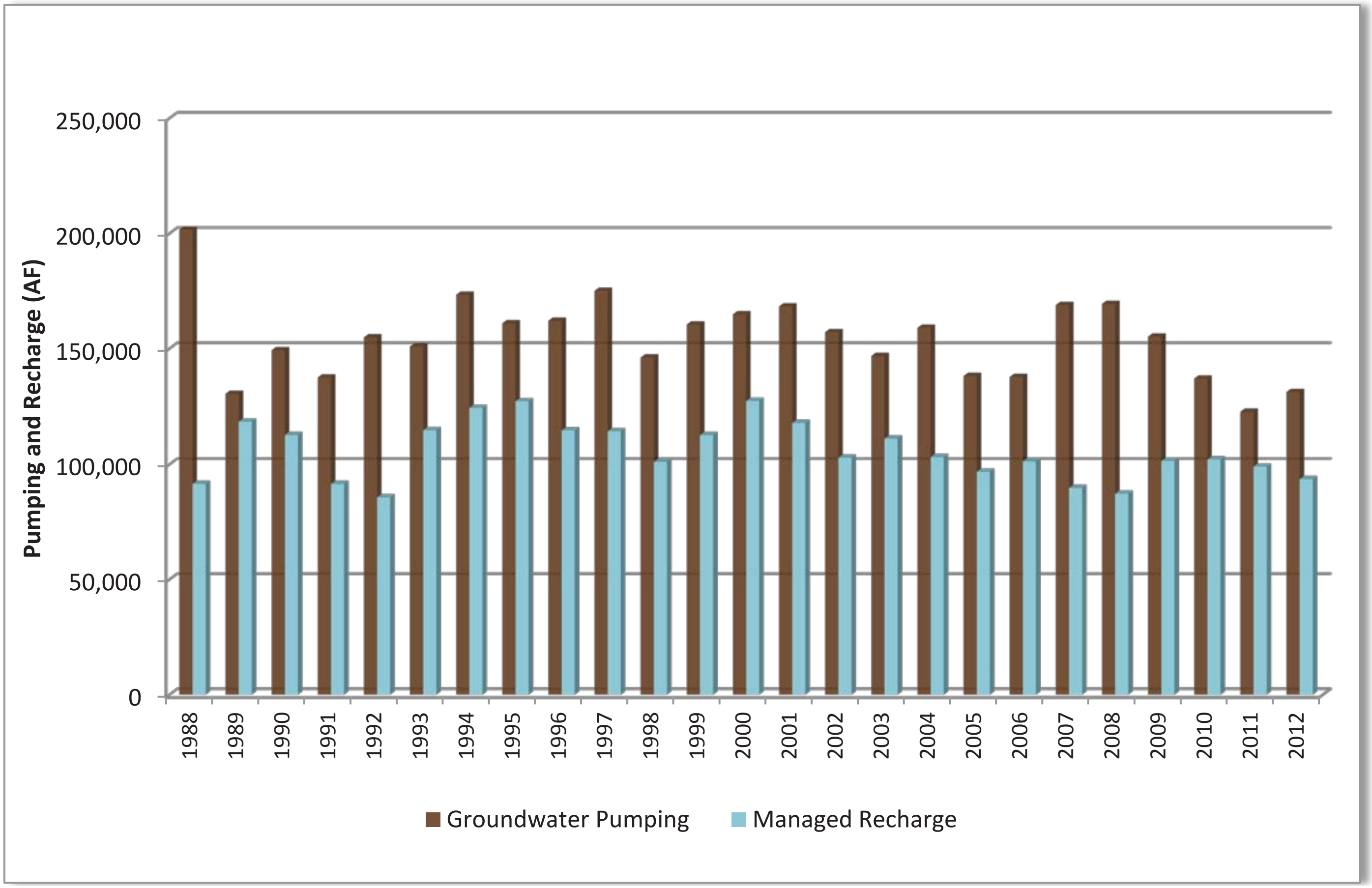


Figure 7 2012 Groundwater Pumping by Use Category (AF)

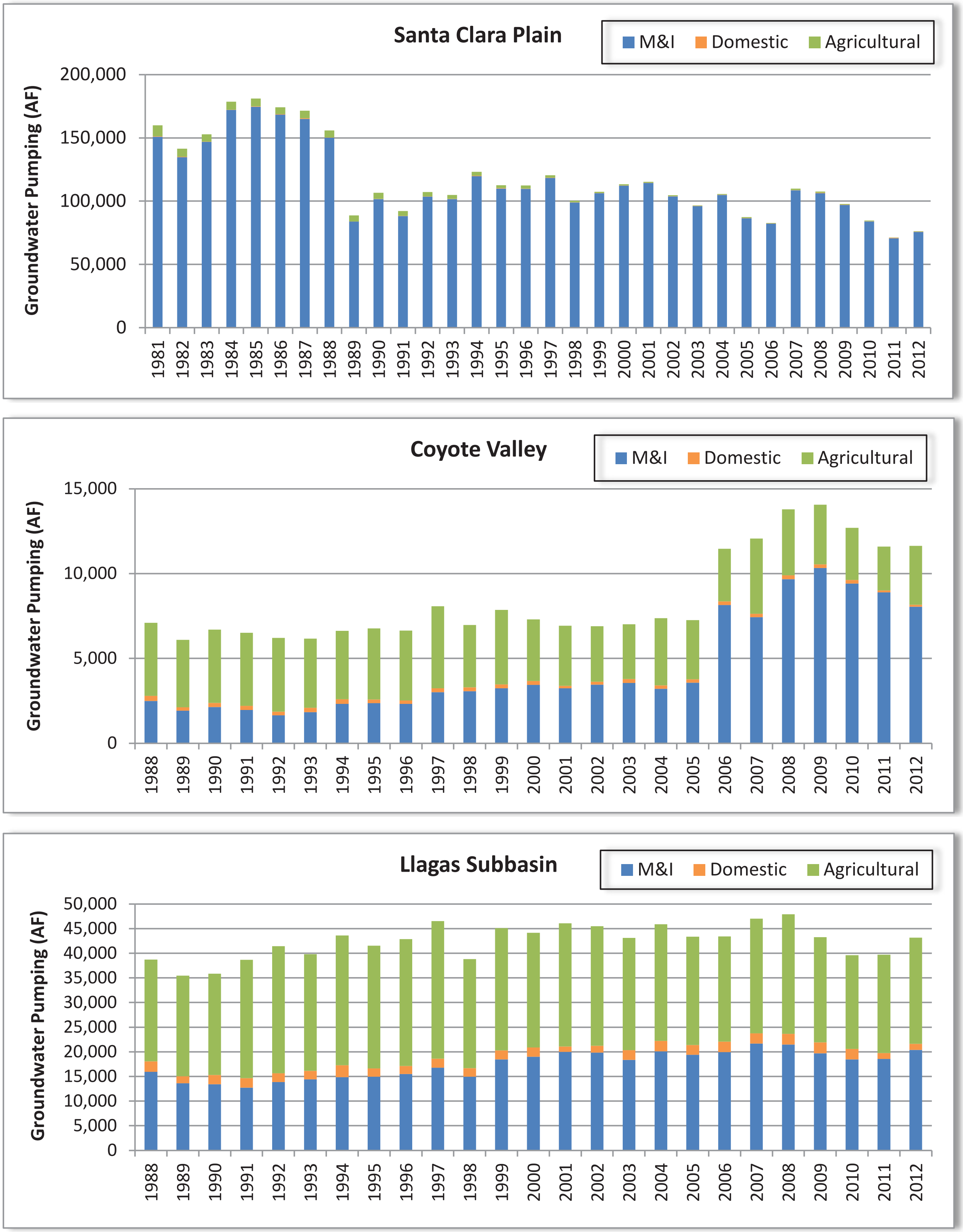


Figure 8 Countywide Water Use by Source (AF)

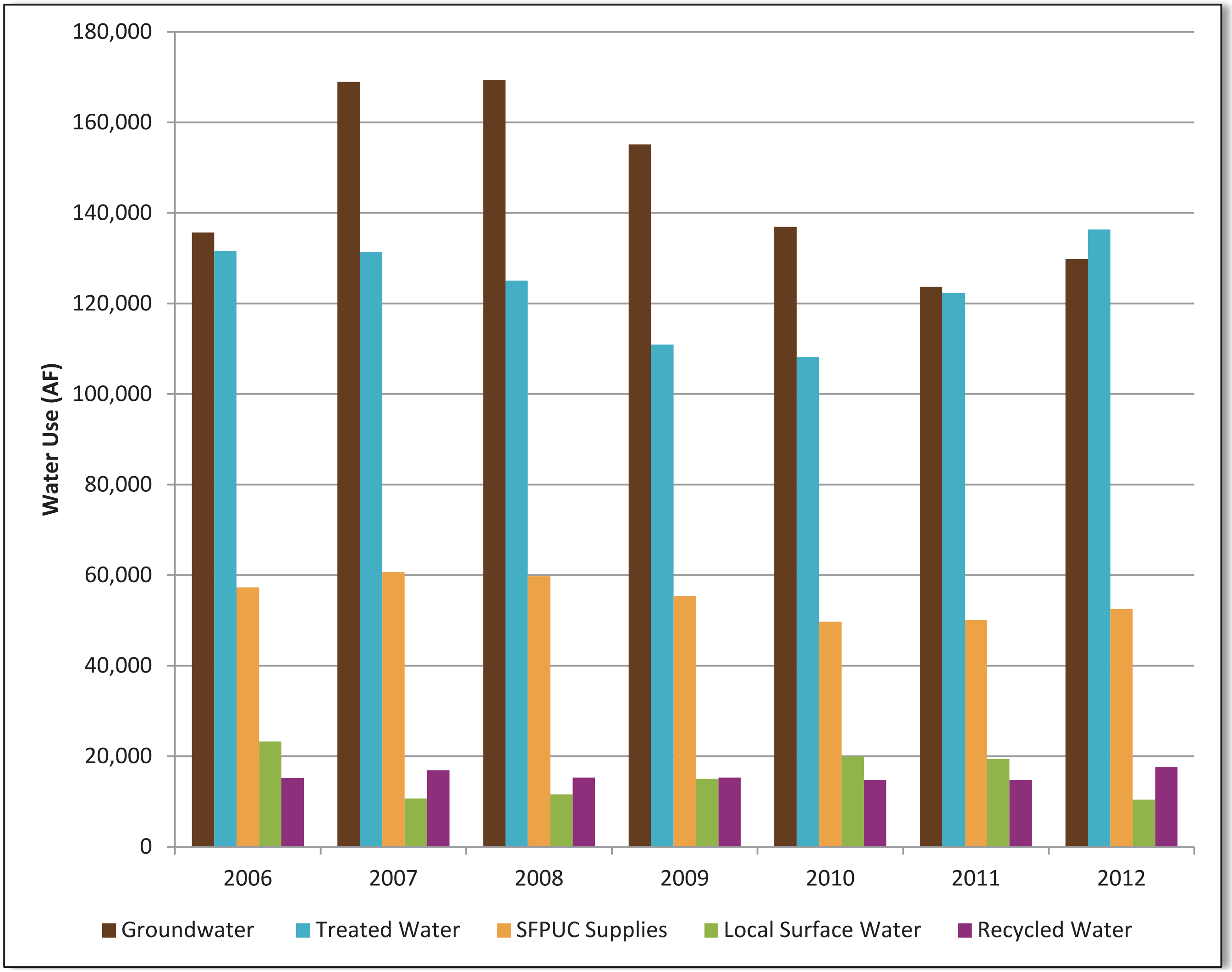
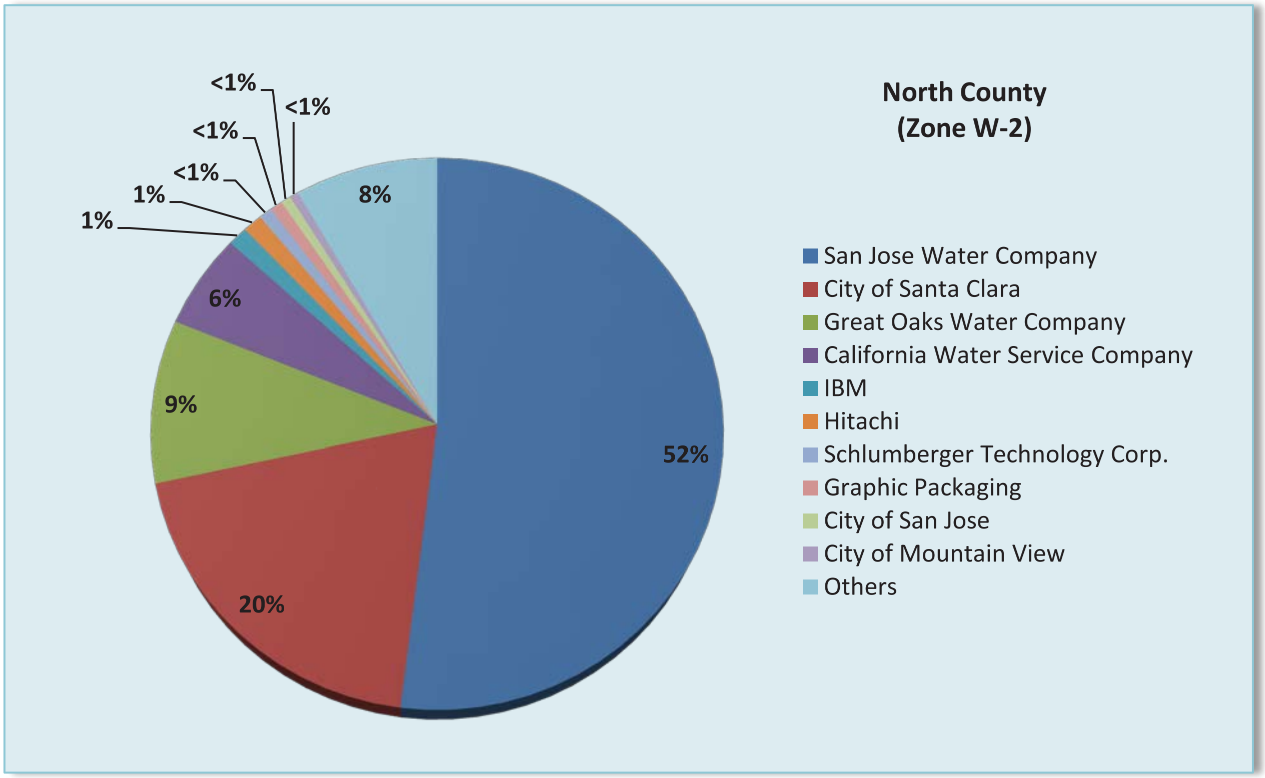
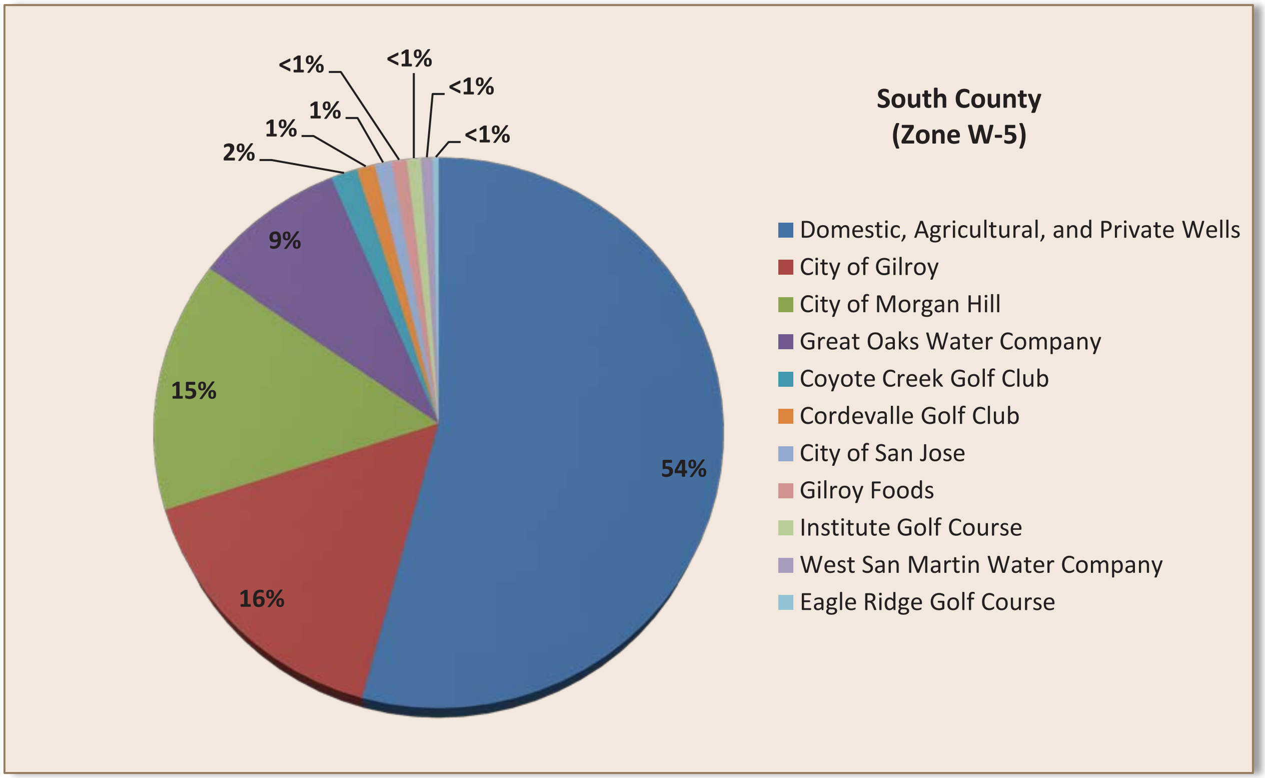


Figure 9 Percent of Total Pumping by Major Groundwater Users in 2012





4. Groundwater Levels and Storage

This section summarizes 2012 groundwater conditions with regard to water levels and storage, including the comparison to other indices and evaluation of the GWMP outcome measure related to groundwater storage.

Groundwater levels were generally similar to or slightly lower than 2011 levels due to semi-dry conditions. However, water levels were well above historical lows at index wells, and overall groundwater conditions were considered healthy. Countywide groundwater storage at the end of 2012 was similar to 2011. The projected end of 2013 total groundwater storage is 338,000 AF and all groundwater management areas meet the storage targets identified in the GWMP outcome measure. Although the targets are currently being met, total storage is projected to decrease by nearly 20,000 AF between 2012 and 2013, and it may be a challenge to continue to meet the GWMP outcome measure if dry conditions continue into the winter and spring.

Groundwater Levels

The collection of comprehensive and accurate data allows the District to evaluate groundwater level and storage conditions to support operational decisions and water supply planning efforts. The District collected depth to water data from 219 wells in 2012 to support the evaluation of regional groundwater levels and storage. Wells were measured on a hourly, daily, bi-weekly, weekly, monthly, or quarterly basis as shown in Figure 10. The District also evaluated water levels from 77 water supply wells measured by water retailers.

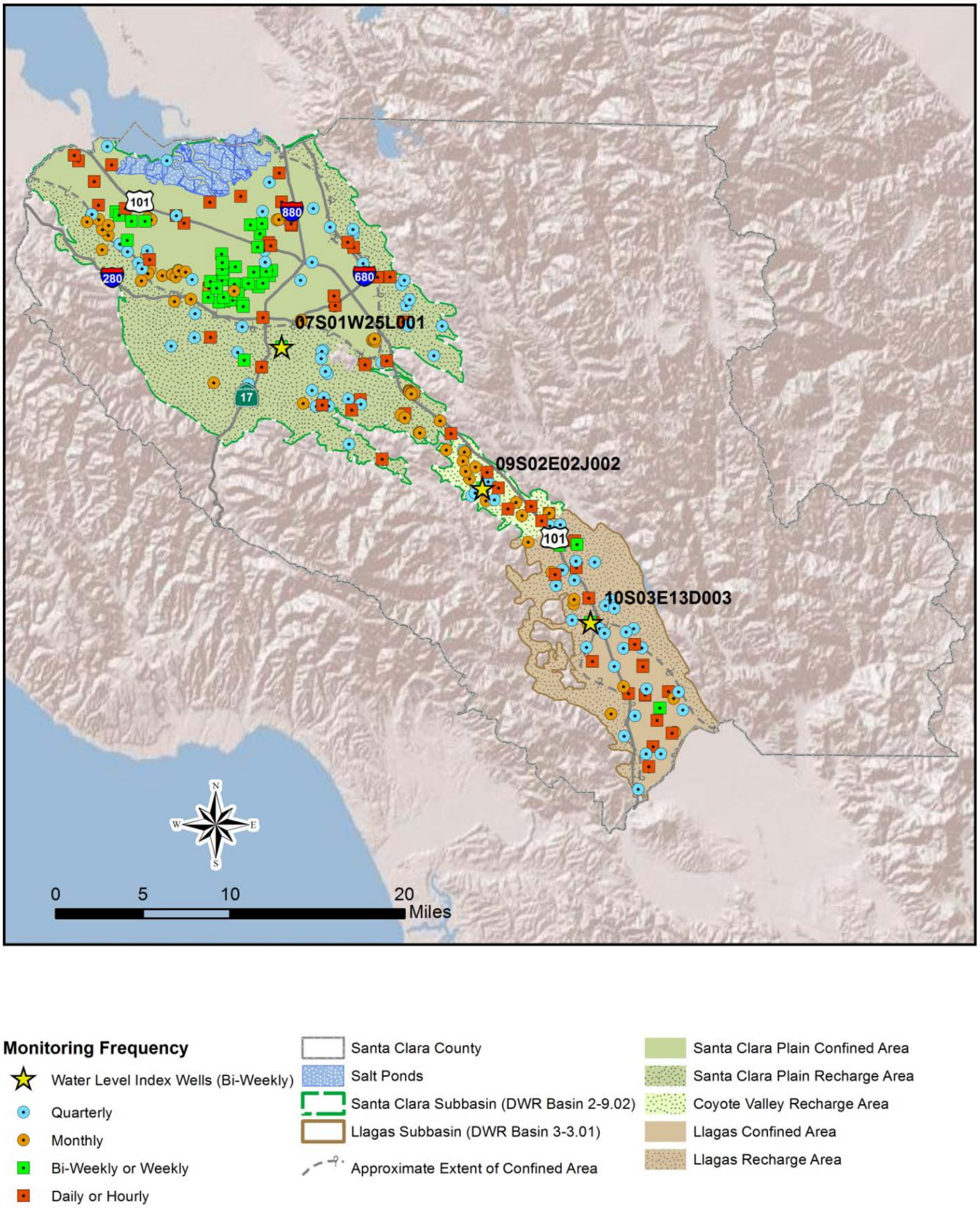
Overall, the hydrology in 2012 was dry until storms in late November and December boosted reservoir storage levels both locally and statewide to average or above average conditions. The District has identified three index wells to represent general conditions within the Santa Clara Plain, Coyote Valley, and the Llagas Subbasin, which are shown on Figure 10. Table 6 shows groundwater levels for the index wells in March and October, which typically represent the seasonal high and low water levels, respectively. Groundwater levels were lower than the previous year as measured at the index wells in October. October water levels in the Coyote Valley and Llagas Subbasin index wells were also lower than the five-year average and the long-term average over the period of record. Although 2012 groundwater levels at the index wells were lower as compared to other indices, water levels were well above the historical lows (Figure 11) and overall groundwater conditions were healthy in 2012. Groundwater levels were also higher than the land subsidence thresholds established to minimize the risk of land subsidence as described further in Section 6.

Table 6 Comparison of 2012 Groundwater Levels at Index Wells to Other Indices (feet above sea level)

Groundwater Subbasin/Area	March 2012	October 2012	October 2011	5 Year Average (2007-2011)	Period of Record (Average)
Santa Clara Subbasin **Santa Clara Plain**	89.55	73.86	80.69	73.04	3.39
Santa Clara Subbasin **Coyote Valley**	264.33	261.36	265.62	266.85	264.64
Llagas Subbasin	231.76	208.17	231.17	218.99	220.12

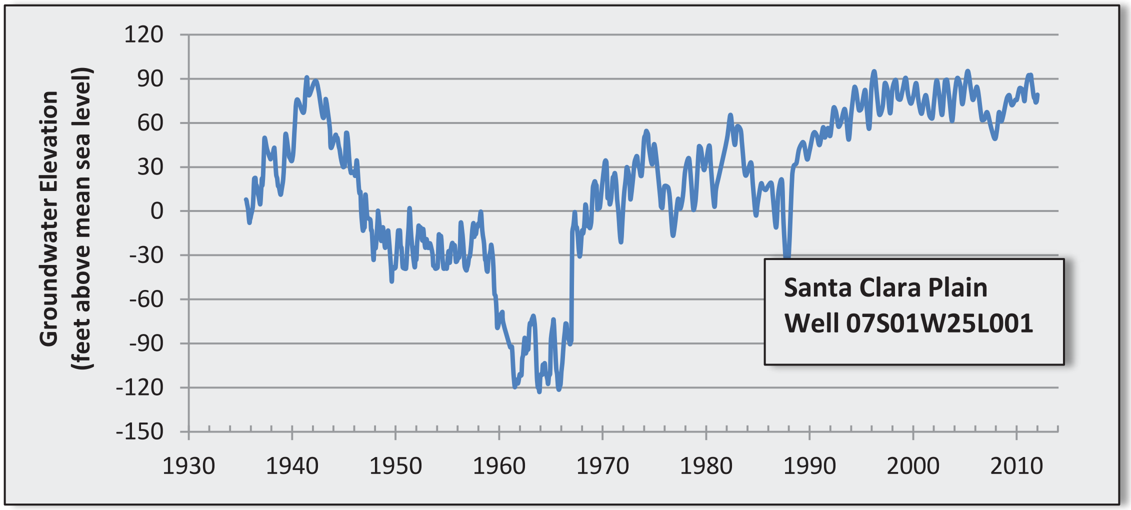
Note: The period of record begins in 1936 for the Santa Clara Plain index well, in 1948 for the Coyote Valley well, and 1969 for the Llagas Subbasin well.

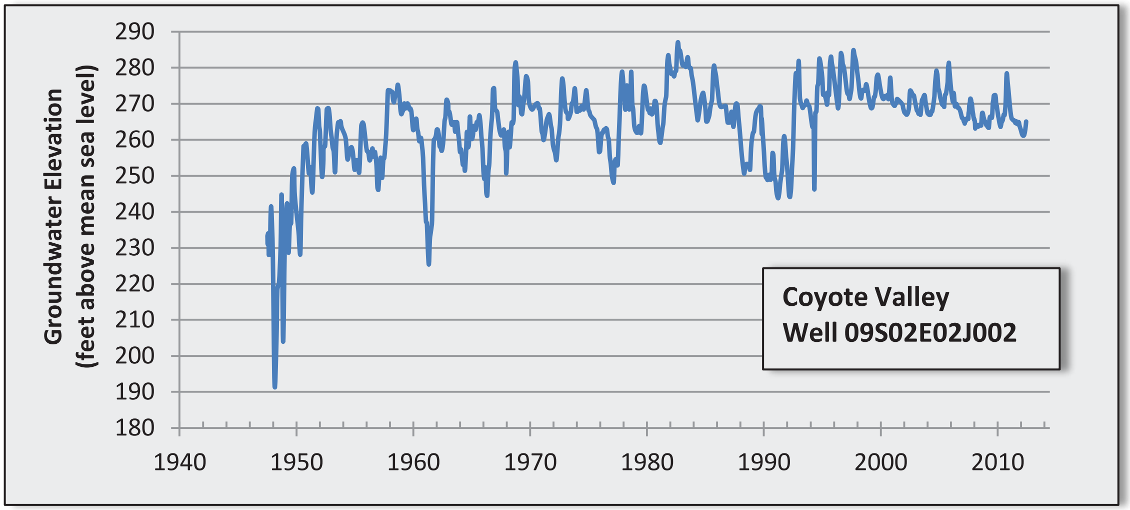
Figure 10 2012 Groundwater Level Monitoring

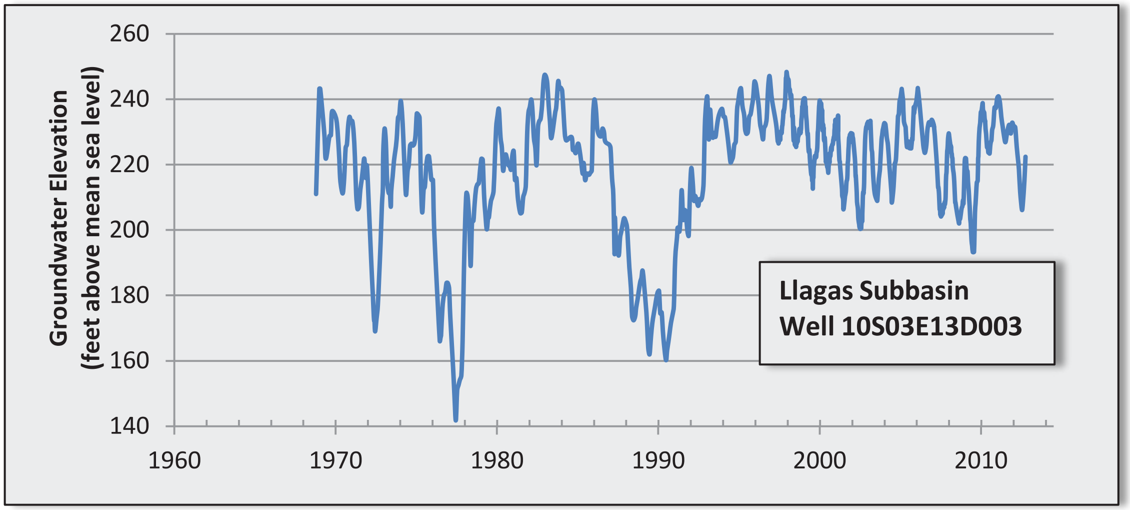

101
880
280
680
17
07S01W25L001
09S02E02J002
10S03E13D003
N
W
E
S
0
5
10
20
Miles
Monitoring Frequency
Water Level Index Wells (Bi-Weekly)
Quarterly
Monthly
Bi-Weekly or Weekly
Daily or Hourly
Santa Clara County
Salt Ponds
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Approximate Extent of Confined Area
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

Santa Clara Valley
Water District

Figure 11 Groundwater Levels at Index Wells







Contours of groundwater elevations for the principal aquifer zone in March and October of 2012 are shown in Figures 12 and 13, respectively. These figures show the typical seasonal pattern of higher groundwater levels in the spring and lower levels in the fall. This is due to seasonal fluctuations in pumping and recharge, with increased pumping and less natural recharge occurring in the summer and fall.

In the Santa Clara Subbasin, groundwater elevations are highest in the Coyote Valley and within the recharge areas of the Santa Clara Plain. Elevations generally decrease within the interior, confined area of the subbasin, and the general groundwater flow direction is northwest toward San Francisco Bay. The effects of concentrated pumping are evident by the pumping depressions shown in the Santa Clara Plain. The District works to maintain adequate pressure in the principal aquifer zone through managed recharge such that groundwater flows toward the bay to keep salt water from entering the Santa Clara Subbasin. Figure 14, which is based on data from selected nested or closely spaced wells, shows the vertical gradient between the shallow and principal zones within the confined area of the Santa Clara Plain. There is an upward vertical gradient closer to the bay, indicating deep groundwater is under artesian pressure. The vertical gradient within the recharge area is generally downward as this is where surface water readily percolates to replenish groundwater.

The highest groundwater elevations in the Llagas Subbasin are in the recharge area in the north and elevations generally decline toward the south. Groundwater generally flows southeast toward the Pajaro River and San Benito County. In general, there is a strong downward vertical flow gradient within the recharge area[7]. Managed and natural recharge within this area maintains groundwater pressures within the confined area, where groundwater exists in partially to fully confined conditions.

The vertical flow gradient is strongly influenced by groundwater recharge and pumping and may vary seasonally in some areas. Artesian flow conditions may occur as pressure increases in confined areas during the rainy season due to higher groundwater recharge and less groundwater pumping. In the same area, the vertical gradient may be reversed during the dry season due to reduced recharge and higher pumping.

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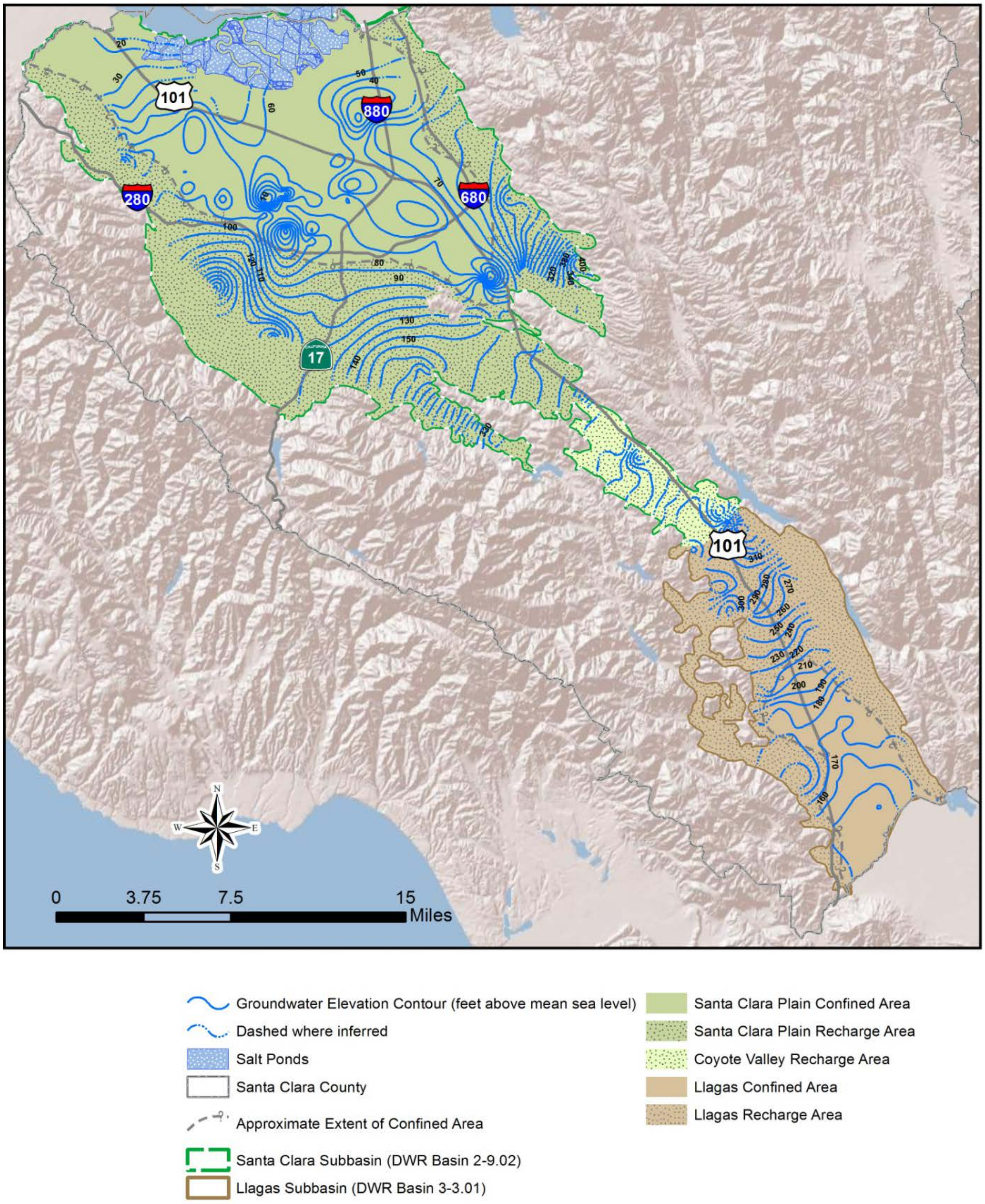
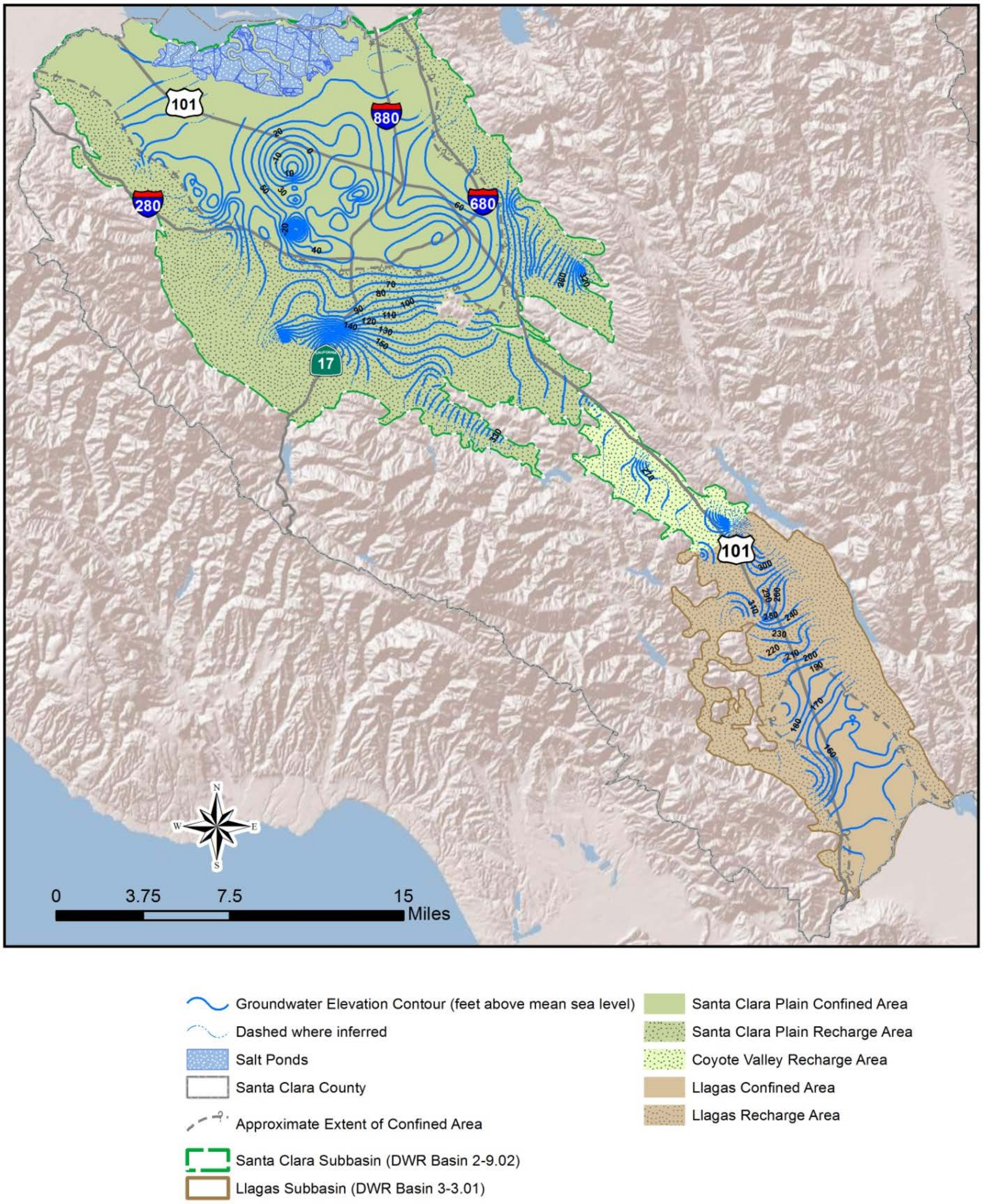
[7] MACTEC Engineering and Consulting, Gradient Driven Remediation Pilot Study Work Plan Olin/Standard Fusee Site 425 Tennant Avenue Morgan Hill, California, April 2011.

Figure 12 Spring 2012 Groundwater Elevation Contours


20
30
101
60
50
40
880
280
680
70
100
120
110
80
90
130
150
17
140
320
380
340
400
330
101
310
300
290
280
270
260
250
240
230
220
210
200
190
180
170
160
N
W
E
S
0
3.75
7.5
15
Miles
Groundwater Elevation Contour (feet above mean sea level)
Dashed where inferred
Salt Ponds
Santa Clara County
Approximate Extent of Confined Area
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

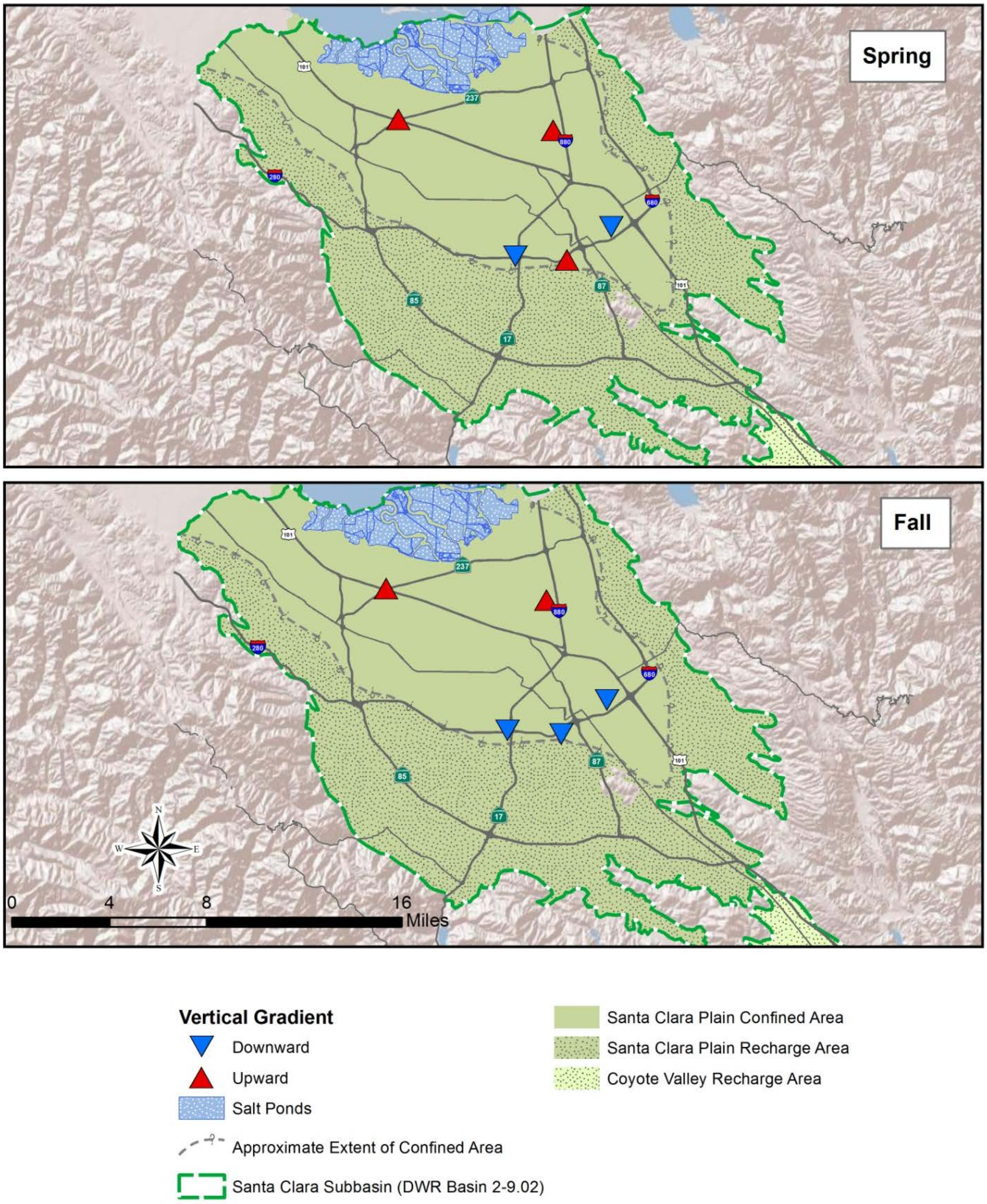
Santa Clara Valley
Water District

Figure 13 Fall 2012 Groundwater Elevation Contours


101
880
280
680
17
101
20
10
0
10
50
30
-20
40
60
70
80
90
100
110
120
130
140
150
260
320
210
220
300
290
280
310
250
240
230
220
210
200
190
170
180
160
0
3.75
7.5
15
Miles
N
E
S
W
Groundwater Elevation Contour (feet above mean sea level)
Dashed where inferred
Salt Ponds
Santa Clara County
Approximate Extent of Confined Area
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

Santa Clara Valley
Water District

Figure 14 2012 Vertical Gradient in Santa Clara Plain Confined Area


Spring
Fall
101
237
880
280
680
87
85
17
N
W
E
S
0
4
8
16
Miles
Vertical Gradient
Downward
Upward
Salt Ponds
Approximate Extent of Confined Area
Santa Clara Subbasin (DWR Basin 2-9.02)
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area

Groundwater Storage

Groundwater storage was well within the normal range in 2012, with the end of year storage similar to that of 2011 (Table 7). The District's Urban Water Management Plan contains a water shortage contingency plan that uses groundwater storage to indicate potential water shortages and outlines the overall strategy for dealing with shortages, including contingency actions. The "normal" stage where no contingency action is needed relates to a projected end of year total groundwater storage of 300,000 AF.

Table 7 Estimated End of Year Groundwater Storage (AF)

Groundwater Subbasin/Area	End of Year 2011	End of Year 2012	End of Year 2013	GWMP Outcome Measure
Santa Clara Subbasin, Santa Clara Plain	303,000	308,000	302,000	278,000
Santa Clara Subbasin, Coyote Valley	12,500	12,500	8,000	5,000
Llagas Subbasin	37,500	37,000	28,000	17,000
Total	**353,000**	**357,500**	**338,000**	**300,000**

Note: Storage estimates are rounded to the nearest 500 AF.

Groundwater Storage Outcome Measures

OM 2.1.1.a.
Greater than 278,000 AF of projected end of year groundwater storage in the Santa Clara Plain.

OM 2.1.1.b
Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley.

OM 2.1.1.c.
Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin.

The outcome measures are currently being met as projected end of year storage for 2013 is 302,000 AF in the Santa Clara Plain, 8,000 AF in the Coyote Valley, and 28,000 AF in the Llagas Subbasin.

Due to ongoing dry conditions, the projected storage for the end of 2013 is nearly 20,000 AF lower than the storage at the end of 2012, with significant declines forecasted in the Coyote Valley and Llagas Subbasin (Table 7). If the next rainfall season is below average, it may be a challenge to maintain groundwater storage above the GWMP outcome measure.

5. Groundwater Balance

This section presents the groundwater balance for 2012, including subbasin inflows, outflows, and the change in storage. The primary inflow was managed recharge, providing 60% of the total inflow. Groundwater pumping accounted for nearly 90% of the subbasin outflows. Inflows to groundwater were greater than outflows in 2012, resulting in a small increase in storage of 4,500 AF countywide.

The water balance provides an assessment of annual inflows and outflows for the Santa Clara Plain, Coyote Valley, and Llagas Subbasin, as shown in Figure 15. It should be noted that many of the terms presented in the water balance cannot be directly measured and represent estimated values from the District's groundwater flow models.

Inflows

Major inflows to the subbasins are primarily controlled by hydrologic conditions and include:

- managed recharge by the District using surface water from local reservoirs and imported water,
- natural recharge, which includes the deep percolation of rainfall and uncontrolled recharge such as natural seepage through creeks and return flows from septic systems and irrigation, and
- subsurface inflow from adjacent aquifer systems.

Total inflows to the subbasins were 154,500 AF in 2012, with managed recharge providing about 60% of the total. Managed recharge was twice as much as the natural recharge for the Santa Clara Plain, and was more than five times greater than the natural recharge in the Coyote Valley. It should be noted that the managed recharge estimate for the Coyote Valley (from the groundwater model) is slightly lower than the value presented earlier in this report, which is based on surface water accounting estimates. Managed recharge in the Llagas Subbasin was approximately equal to natural recharge in 2012. Natural recharge provided about 34% of total subbasin inflow in 2012, and subsurface inflow accounted for about 6% of the total inflow.

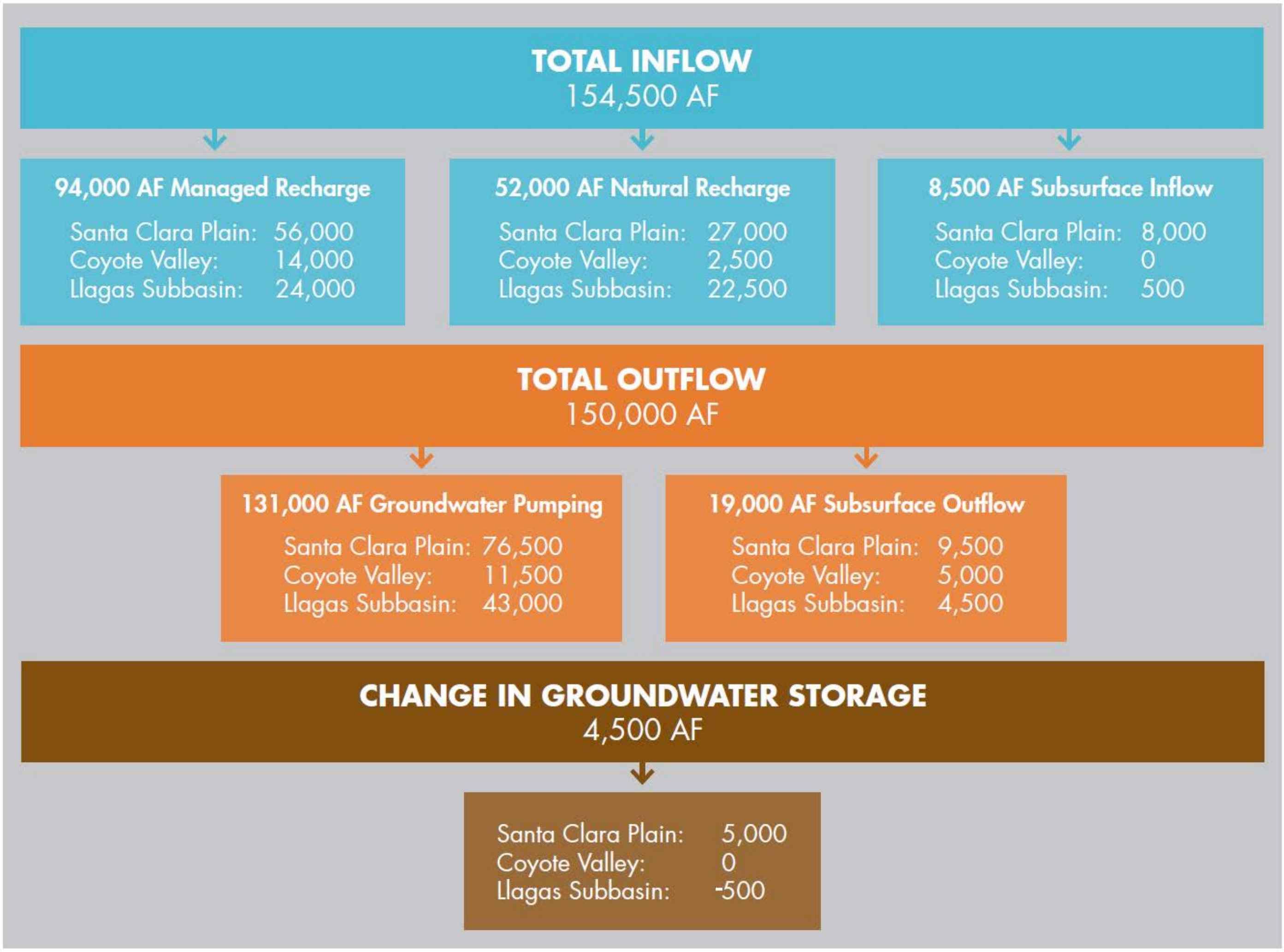
Outflows

The primary outflow is groundwater pumping, which accounts for 87% of the total outflow of 150,000 AF in 2012. Subsurface outflow to adjacent aquifer systems was about 19,000 AF, or 13% of the total outflow. This included approximately 9,500 AF of subsurface flow from the Santa Clara Plain to San Francisco Bay and 4,500 AF of subsurface outflow to the Bolsa Subbasin in San Benito County.

Change in Storage

Based on the estimated inflows and outflows, there was an estimated small increase in storage of 4,500 AF in 2012. Storage in the Santa Clara Plain increased by about 5,000 AF while there was a slight decrease in storage in the Llagas Subbasin of 500 AF. There was a net zero change in storage in the Coyote Valley, indicating stable conditions. In general, the storage was relatively stable throughout the county despite a semi-dry year in 2012.

Figure 15 2012 Groundwater Balance



Notes:

1. Groundwater balance terms presented are estimates based on calibrated groundwater flow models and values are rounded to the nearest 500 AF.
2. Managed recharge represents direct replenishment by the District using local and imported water. Estimates from the groundwater models may differ slightly from surface water accounting estimates.
3. Natural recharge includes all uncontrolled recharge, including the deep percolation of rainfall, septic system and/or irrigation return flows, and natural seepage through creeks.
4. Subsurface inflow represents inflow from adjacent aquifer systems. In the Santa Clara Plain, this includes inflow from the Coyote Valley. In the Llagas Subbasin, it represents inflow from the Bolsa Subbasin in San Benito County.
5. Groundwater pumping is based on pumping reported by water supply well owners.
6. Subsurface outflow represents outflow to adjacent aquifer systems. In the Santa Clara Plain, this includes outflows to San Francisco Bay. In Coyote Valley, this includes outflow to the Santa Clara Plain, and in the Llagas Subbasin, this includes outflows to the Bolsa Subbasin in San Benito County.

6. Land Subsidence

This section presents the results of land subsidence monitoring in 2012, including data collected from extensometers, land surface elevation surveys, and subsidence index wells as it compares to the GWMP outcome measure related to land subsidence. District thresholds established to evaluate land subsidence conditions were met in 2012, indicating a low risk of permanent land subsidence.

The Santa Clara Plain is vulnerable to land subsidence, with approximately 13 feet of inelastic (permanent) land subsidence observed in San Jose between 1915 and 1969 due to groundwater overdraft. Significant inelastic subsidence was essentially halted by about 1970 through the District's expanded conjunctive use programs, which allowed artesian heads to recover substantially.

Some amount of elastic subsidence occurs annually in response to seasonal pumping and recharge as substantiated by previous ground surface elevations measured with Interferometric Synthetic Aperture Radar (InSAR)[8]. To avoid additional permanent subsidence due to groundwater overdraft, the District has established water level thresholds at ten index wells throughout the Santa Clara Plain[9]. A tolerable rate of 0.01 feet per year of subsidence[10] was applied to determine threshold groundwater levels for these wells. These subsidence thresholds are the groundwater levels that must be maintained to ensure a low risk of unacceptable land subsidence.

The District conducts ongoing monitoring of land surface elevation benchmarks and extensometers and evaluates water levels at subsidence index wells to determine if land subsidence is occurring or is threatening to exceed established thresholds. Subsidence monitoring points are shown in Figure 16. 2012 monitoring results from extensometers, benchmark surveys, and subsidence index wells indicate a low risk of subsidence as described further below.

Extensometer Monitoring

The District conducts ongoing monitoring at two 1,000 foot deep extensometers that measure vertical ground motion relative to a central, isolated pipe set beneath the water bearing units. The extensometers are located in Sunnyvale near Moffett Field ("Sunny") and near downtown San Jose ("Martha") and are equipped with data loggers to provide hourly readings of land subsidence and water level. The District evaluates the arithmetic average of land subsidence measured during the last 11 years at the two extensometers to determine if it meets the tolerable rate of land subsidence of 0.01 feet/year.

The arithmetic average over the last 11 years for the two extensometers is -0.001 feet/year, which indicates net land uplift over the period and meets the tolerable land subsidence rate of 0.01 feet/year. The average for the previous period (2001 to 2011) was -0.001 feet/year so there has been little change in land subsidence conditions from 2011 to 2012 as measured at the extensometers. Figure 17 shows cumulative subsidence measured at the extensometers for the period of record and is supplemented with nearby benchmark data. This figure indicates that land subsidence conditions have been relatively stable for many years. The figure also shows the close correlation between the District's land subsidence model, which is used to forecast land subsidence, and actual data.

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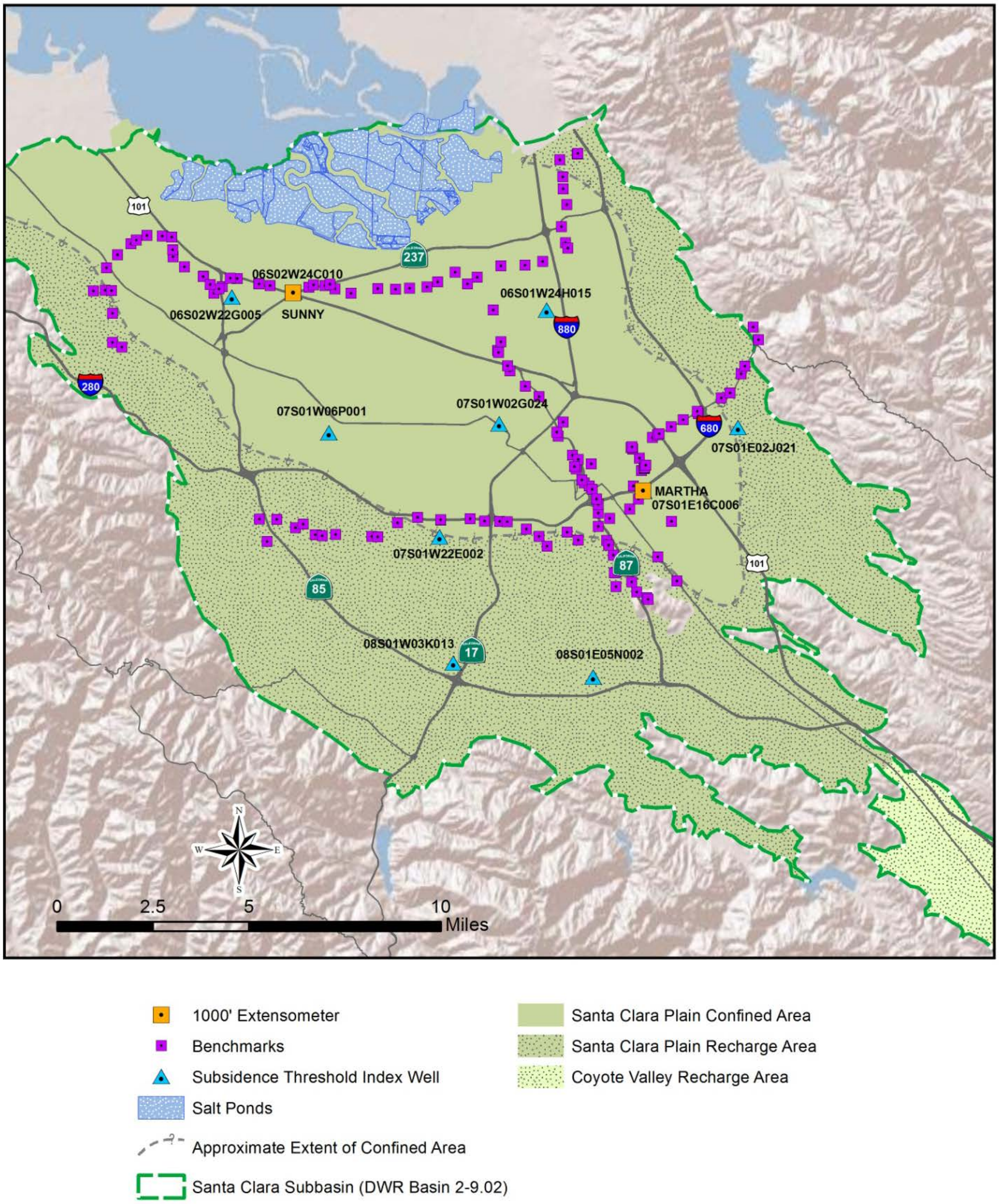
[8] Schmidt, D.A. and Burgmann, R., Time-Dependent Land Uplift and Subsidence in the Santa Clara Valley, California from a Large Interferometric Synthetic Aperture Radar Data Set, Journal of Geophysical Research, Volume 108, No. B9, 2003.

[9] Geoscience Support Services Inc. for Santa Clara Valley Water District, Subsidence Thresholds in the North County Area of Santa Clara Valley, 1991.

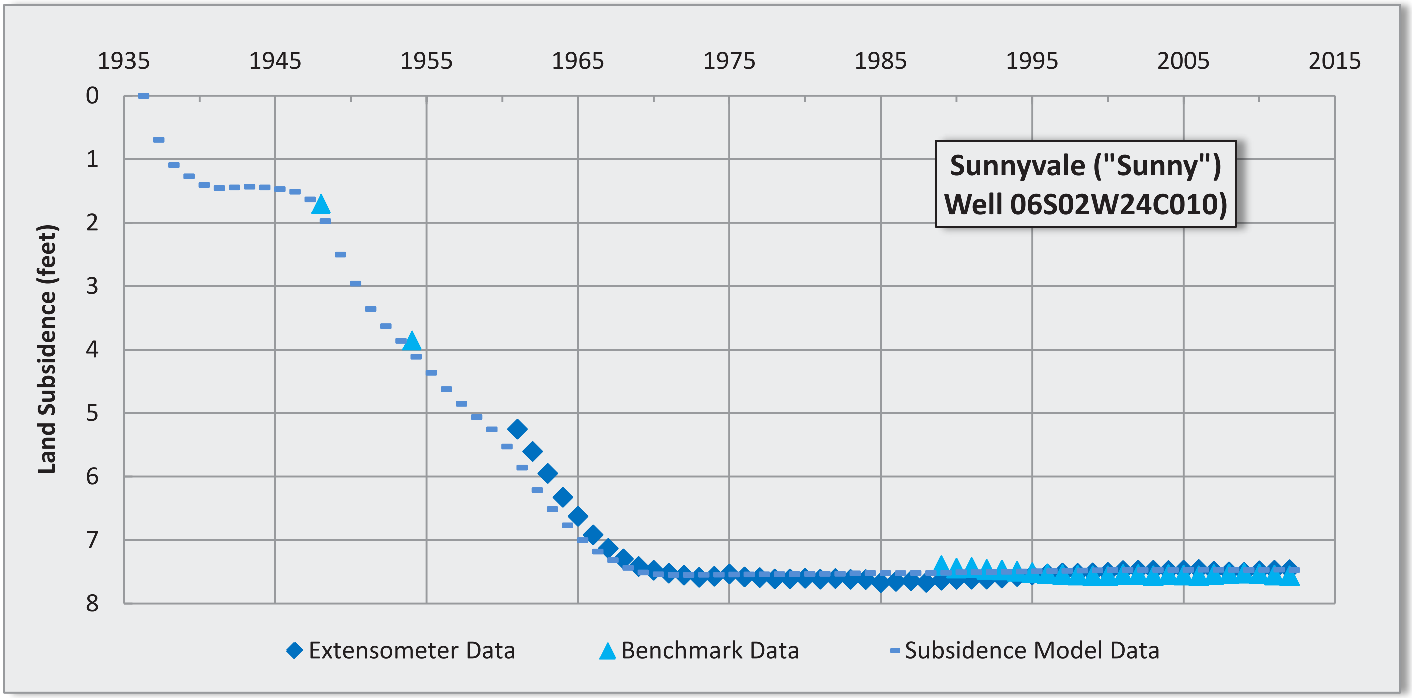
[10] The acceptable subsidence rate of no more than 0.01 feet per year on average was endorsed by the District's Water Retailer Groundwater Subcommittee.

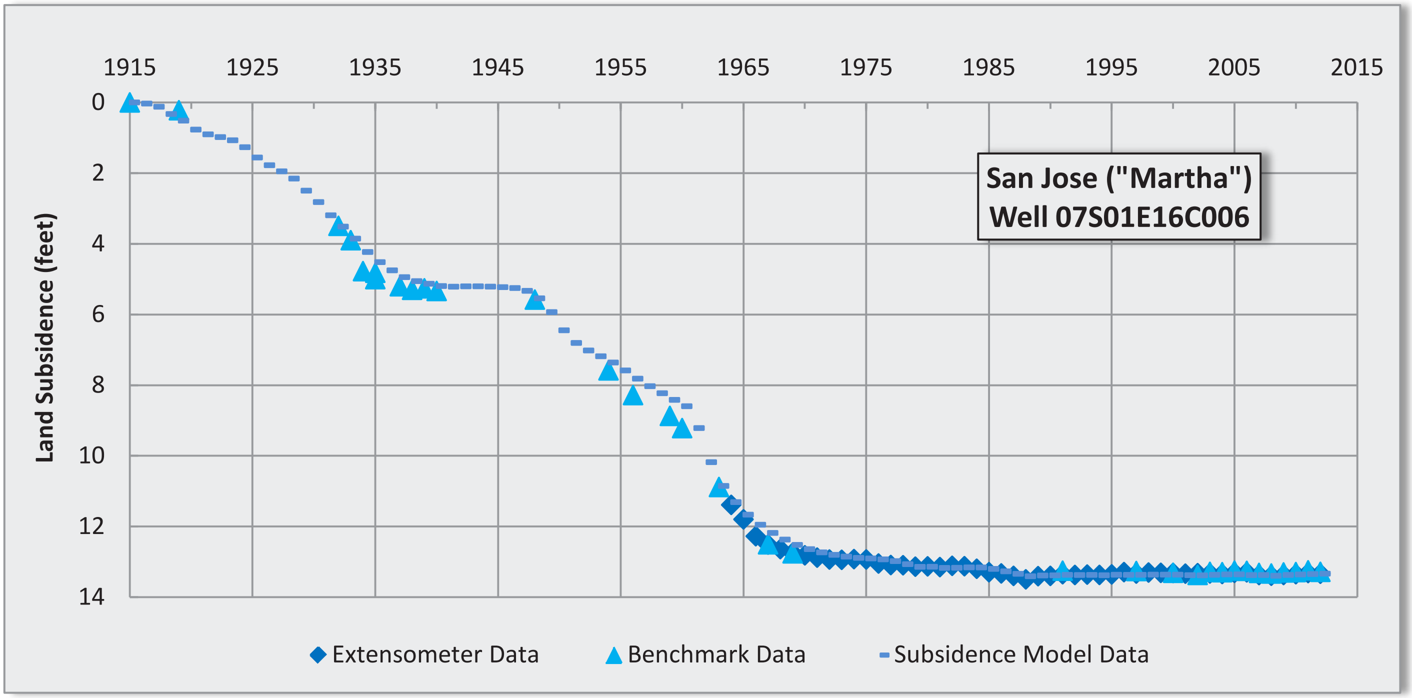
Figure 16 **2012 Land Subsidence Monitoring**



Santa Clara Valley Water District

Figure 17 Cumulative Land Subsidence





Elevation Surveys

Periodic surveys of land elevation have been conducted in Santa Clara County since 1934[11]. The District's current benchmark leveling program consists of annual surveys along three level circuits to determine the elevations of survey benchmarks.

In 2012, the District measured the land surface elevation at 146 benchmarks throughout the Santa Clara Plain to evaluate the spatial variability of land subsidence. Regional benchmark data supports the extensometer data in indicating that the average annual change of land surface over the last 11 years does not exceed the tolerable rate of subsidence of 0.01 feet per year.

Subsidence Index Wells

Groundwater level monitoring is an integral part of land subsidence monitoring because changes in water level due to overdraft are the driving force of the land subsidence in the Santa Clara Plain. The District measures water level at ten subsidence index wells on a regular basis (daily to quarterly) to ensure they remain above the subsidence threshold established at each location. If water levels go below these levels for extended periods, permanent land subsidence may resume, resulting in an increased risk of flooding and damage to utilities.

Figure 18 shows that the lowest historical water levels were generally observed in the 1960s and 1970s. Since then, groundwater levels have recovered, primarily due to the District's managed recharge and in-lieu recharge programs. Measured groundwater levels are consistently above the subsidence threshold from 2002 to 2012 at all subsidence index wells. The water level in the principal aquifer zone at three wells along San Francisco (06S02W22G005, 06S02W24C010, and 06S01W24H015) is near or above the land surface, which helps prevent further land subsidence and keeps salt water from entering the subbasin. The District will continue to frequently track data from the subsidence index wells and consider this information in operations planning efforts.

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[11] USGS, Land Subsidence in the Santa Clara Valley, California as of 1982, Professional Paper 497-F, 1988.

Figure 18 Groundwater Elevation at Subsidence Index Wells

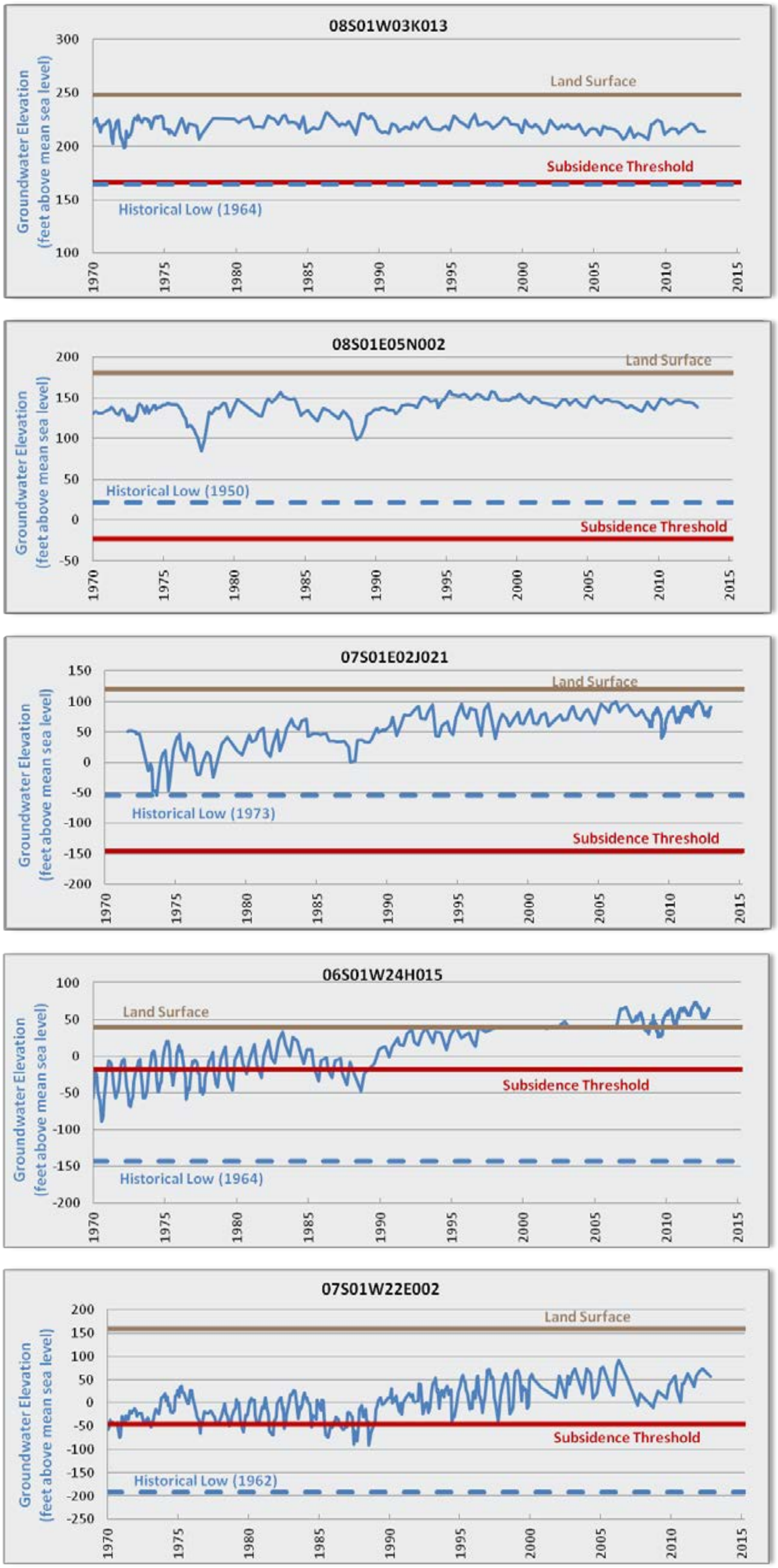
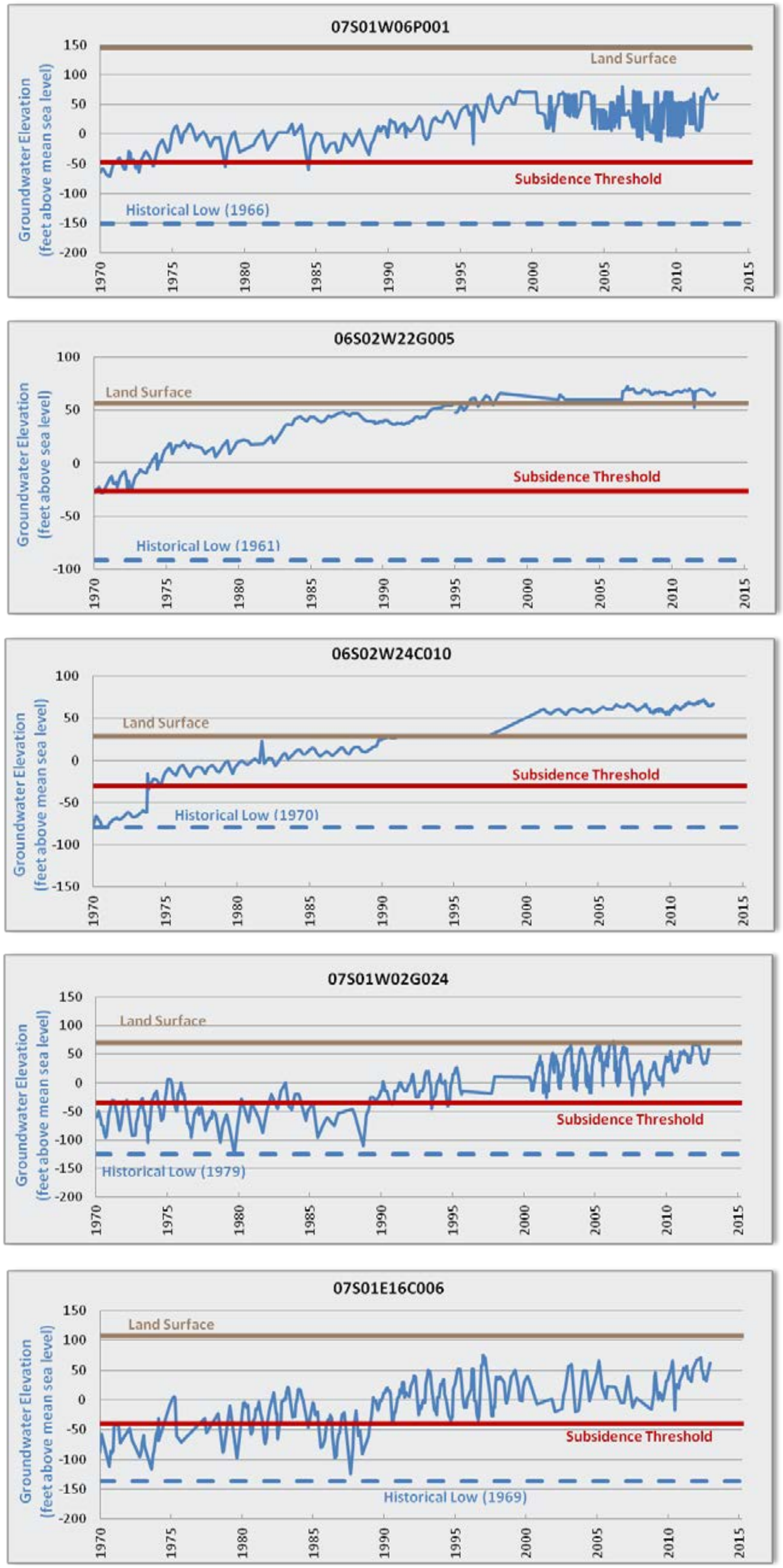


Figure 18 Groundwater Elevation at Subsidence Index Wells, continued



Land Subsidence Outcome Measure

OM 2.1.1.d.
100% of subsidence index wells with groundwater levels above subsidence thresholds.

The outcome measure is met as groundwater levels were above subsidence thresholds at all ten index wells throughout calendar year 2012.

7. Groundwater Quality

This section presents the results of groundwater quality monitoring in 2012, including data collected by the District and local water suppliers. Also summarized is performance of the GWMP outcome measures related to groundwater quality in terms of drinking water standards, agricultural water quality objectives, and water quality trends. This section also presents water quality data collected by the District at recharge facilities and near recycled water irrigation sites.

Groundwater in the Santa Clara and Llagas Subbasins is generally of high quality with nearly all water supply wells meeting primary drinking water standards for all parameters. The primary exception is nitrate, which is elevated in about 30% of South County water supply wells (primarily domestic wells) due to historic and ongoing sources. For this reason, the outcome measure related to drinking water standards is not met for 2012. The District is developing Salt and Nutrient Management Plans with basin stakeholders which are expected to be completed in 2014. The District will also begin a rebate program for nitrate treatment systems for domestic wells with elevated nitrate in fiscal year 2014. The outcome measure related to water quality trends is met for nitrate (which indicates generally stable or decreasing concentrations) and total dissolved solids, and is nearly met for chloride. The outcome measure for agricultural objectives is met, indicating water quality is suitable for agricultural uses.

Monitoring at the Los Gatos, Penitencia, Lower Llagas, and Upper Llagas recharge systems indicates that recharge water quality is generally very good and is typically similar to or better than the underlying groundwater quality. The managed recharge systems sampled do not appear to be impacted by salinity, runoff, or trace metals.

Groundwater monitoring near recycled water irrigation sites shows some increasing trends for salts and low-level detections of disinfection by-products and other constituents. The District will continue monitoring to track water quality changes and will continue to work with stakeholders to identify ways to minimize the risk of groundwater contamination.

Groundwater Quality Summary

To assess regional groundwater quality conditions, the District sampled groundwater quality at 121 wells, including 101 monitoring wells and 20 domestic wells in the fall of 2012 (Figure 19)[12]. The District's Water Quality Laboratory analyzed over 40 parameters at each well including major and minor ions, nutrients, and trace metals. In addition to these parameters that are sampled annually, the District also conducted testing for nitrosamines and several radiological parameters to assess their occurrence. The District also evaluated data for various parameters from over 225 public water supply wells sampled by water retailers and reported to CDPH for regulatory compliance.

To evaluate general water quality conditions, the District determined the median and range for each parameter tested for each groundwater subbasin and aquifer zone (shallow and principal)[13]. These results can be found in Appendix B and are also discussed further in a technical memorandum[14]. The results indicate that groundwater in the Santa Clara and Llagas Subbasins is generally of high quality. General water quality indicators, major and minor ions, and trace elements were within the normal range that would be expected in groundwater, with the exception of nitrate. Elevated nitrate is primarily an issue in South County due to historic and ongoing sources including synthetic fertilizer use and septic systems.

---

[12] The District also collected limited water quality data at over 200 domestic wells in 2012 as part of the Domestic Well Testing Program. The results for all domestic wells are summarized in the following section.

[13] This could only be performed for wells with known construction information. The District also tested basic water quality at many other domestic wells where the construction is not known; those results are summarized in the following section. CDPH wells are assumed to represent the principal aquifer zone if no construction information was available as these are typically deep wells.

[14] Santa Clara Valley Water District, Calendar Year 2012 Regional Groundwater Quality Monitoring Summary, July 2013.

The median values for nitrate and total dissolved solids (TDS), which is generally used to characterize salts, are presented in Table 8 below. As shown, the median 2012 concentration of nitrate and TDS for each groundwater management area and aquifer zone is generally similar to that of 2011. Minor fluctuations in water quality are expected because the specific wells monitored each year vary and due to hydrogeologic conditions such as recharge and pumping.

Comparison to Drinking Water Standards

Nearly 30% of South County water supply wells tested contained nitrate above the MCL of 45 milligrams per liter (mg/L). Nearly all of these detections were from private domestic wells that are not regulated. Public water systems must comply with drinking water standards, which may require treatment or blending prior to customer delivery. There were no water supply wells with nitrate above the MCL in North County.

The only other parameters detected above the MCL in water supply wells were antimony (in one North County well) and fluoride (in one South County well). It is not uncommon to see a small number of wells with metals or ions above the MCL and these are likely due to localized geologic conditions. With the exception of nitrate, 99% of water supply wells tested in 2012 met all health-based drinking water standards. The location of water supply wells with nitrate, antimony, or fluoride above the MCL is shown in Figure 20.

Table 8 Median Nitrate and TDS by Subbasin and Aquifer Zone (mg/L)

	Santa Clara Subbasin						**Llagas Subbasin**			
	Santa Clara Plain Shallow Zone		**Santa Clara Plain Principal Zone**		**Coyote Valley**		**Shallow Zone**		**Principal Zone**	
Parameter	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**
Nitrate (as NO_3)	2.9	3.3	15	12.4	11.7	10.6	48	40.5	21.2	24
TDS	451	456	380	395	359	358	426	422	360	340

Notes:

1) Nitrate has a health-based MCL of 45 mg/L. TDS has an aesthetic-based MCL, which ranges from 500 to 1,000 mg/L (recommended and upper limit, respectively).
2) Table includes information for monitoring wells, public water supply wells, and domestic wells for which construction information is available. The set of wells sampled each year varies.

Evaluation of Water Quality Trends

To assess changes in water quality over time, the District evaluated statistical trends for chloride, nitrate, and TDS within the shallow and principal aquifer zones of the Santa Clara and Llagas Subbasins. Trend evaluation was performed for all wells (including water supply and monitoring wells) with at least 5 water quality results over the last fifteen years (1998 through 2012). The results are shown in Figures 21 through 23 and are summarized in Table 9, which indicates that the majority of wells show a stable or decreasing trend over this time period.

Table 9 Trend Testing Results for Chloride, Nitrate, and TDS (1998 – 2012)

Parameter	Number of Wells Evaluated	Wells with Stable or Decreasing Trend	Number of Wells with Increasing Trend
Chloride	249	89%	28
Nitrate (as NO_3)	408	93%	27
TDS	239	97%	8

In general, there is no clear spatial pattern for wells with increasing trends in chloride, as in most cases nearby wells have stable or decreasing trends (Figure 21). There is a cluster of shallow wells in the area historically affected by salt water intrusion with decreasing trends, as noted below. Nitrate is generally stable or decreasing throughout the county, and a cluster of wells with decreasing trends is observed in the southern portion of the Santa Clara Plain near the Coyote Valley (Figure 22). This may be the result of dilution from the managed recharge of high quality water through Coyote Creek. As with chloride, there is otherwise no obvious widespread spatial pattern with regard to nitrate. Only a small percentage of wells had increasing trend for TDS, indicating generally stable conditions.

Salt Water Intrusion Conditions

Salt water intrusion of shallow aquifers has been observed historically near South San Francisco Bay and along the Guadalupe River and Coyote Creek in the northern portion of the Santa Clara Plain. As previously discussed, the District has implemented managed recharge and in-lieu recharge programs to minimize the risk of groundwater overdraft, land subsidence, and salt water intrusion.

Every three years, the District monitors chloride in wells located in the area historically affected by salt water intrusion to ensure salt water is not further intruding into the basin. The District uses a chloride concentration of 100 mg/L to indicate influence from salt water. This is a conservative indicator as the aesthetic-based MCL for chloride is 250 mg/L. 2012 monitoring indicates that chloride concentrations in historically affected areas are continuing to decline, with the location of wells exceeding 100 mg/L fairly close to the bay or extending slightly inland along the Guadalupe River and Coyote Creek (Figure 24). The majority of shallow wells in this area have downward trends for chloride, demonstrating that salt water intrusion front appears to be stable or retreating. Figure 24 also shows the approximate location of the 100 mg/L chloride contour line for 1945[15], which represents conditions prior to significant salt water intrusion, and 2002[16].

Comparison to Agricultural Objectives

The District also evaluated general groundwater quality in South County against agricultural water quality objectives identified in the applicable Regional Water Quality Control Board Basin Plan[17] to assess suitability for agricultural uses. Because the District has limited access to agricultural wells, the water quality for all available wells, including domestic and monitoring wells was evaluated. In Coyote Valley, all wells met the Basin Plan agricultural objectives and in the Llagas Subbasin, 94% of the wells met agricultural objectives.

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[15] Santa Clara Valley Water District, Saltwater Intrusion Investigation, Santa Clara County Baylands, 1980.

[16] Santa Clara Valley Water District, Groundwater Conditions 2002/2003, January 2005.

[17] Groundwater in the Coyote Valley is compared to the limits shown in Table 3-6 of the San Francisco Bay Basin (Region 2) Water Quality Control Plan (December 2011) and groundwater in the Llagas Subbasin is compared to Table 3-3 (using the upper end of the “increasing problems” range) and Table 3-4 (irrigation supply) of the Water Quality Control Plan for the Central Coast Basin (June 2011).

Special Monitoring in 2012

The District conducted special monitoring for nitrosamines and radiological parameters (gross alpha and beta particles) in 2012 to assess their occurrence. Certain minerals are radioactive and may emit alpha or beta radiation. Some people who drink water containing alpha or beta particles in excess of the MCL over many years may have an increased risk of getting cancer. In 2012, gross alpha and beta particles were detected throughout the county at low levels consistent with naturally-occurring sources.

Nitrosamines, including N-Nitrosodimethylamine (NDMA), are semi-volatile organic substances that are by-products of the water disinfection process and are probable human carcinogens. The District conducted basin-wide monitoring to assess the occurrence of NDMA after it was detected in shallow groundwater during a recycled water study[18]. In 2012, NDMA was detected above the reporting limit of 2 nanograms per liter (ng/L) in only one well out of 85 tested. NDMA was detected at trace levels (2.1 ng/L), below the CDPH notification level of 10 ppt (there is no regulatory standard for NDMA). The District will continue to monitor available technical and regulatory information related to nitrosamines, but it does not appear that NDMA is commonly found in water supply wells in the county.

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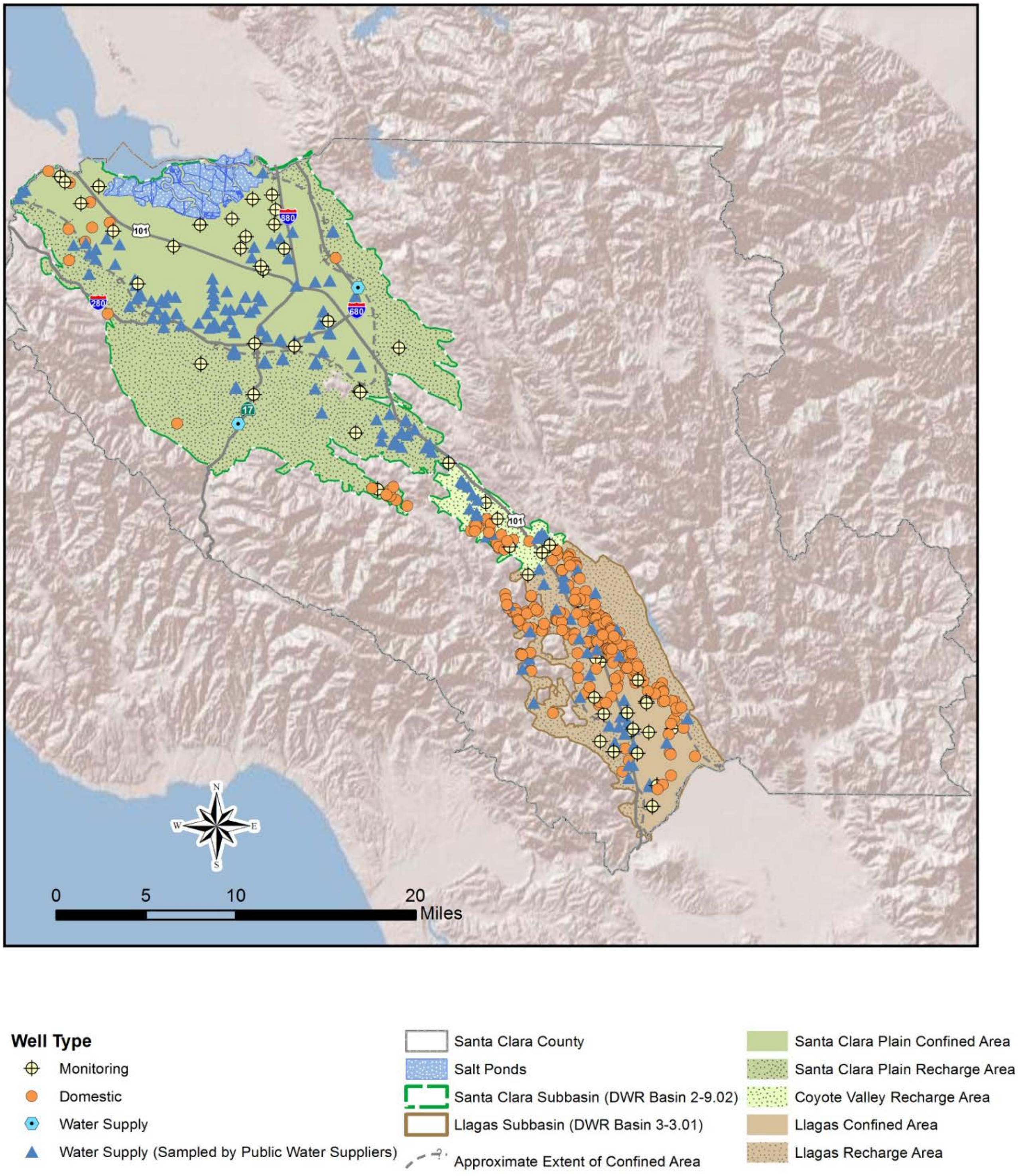
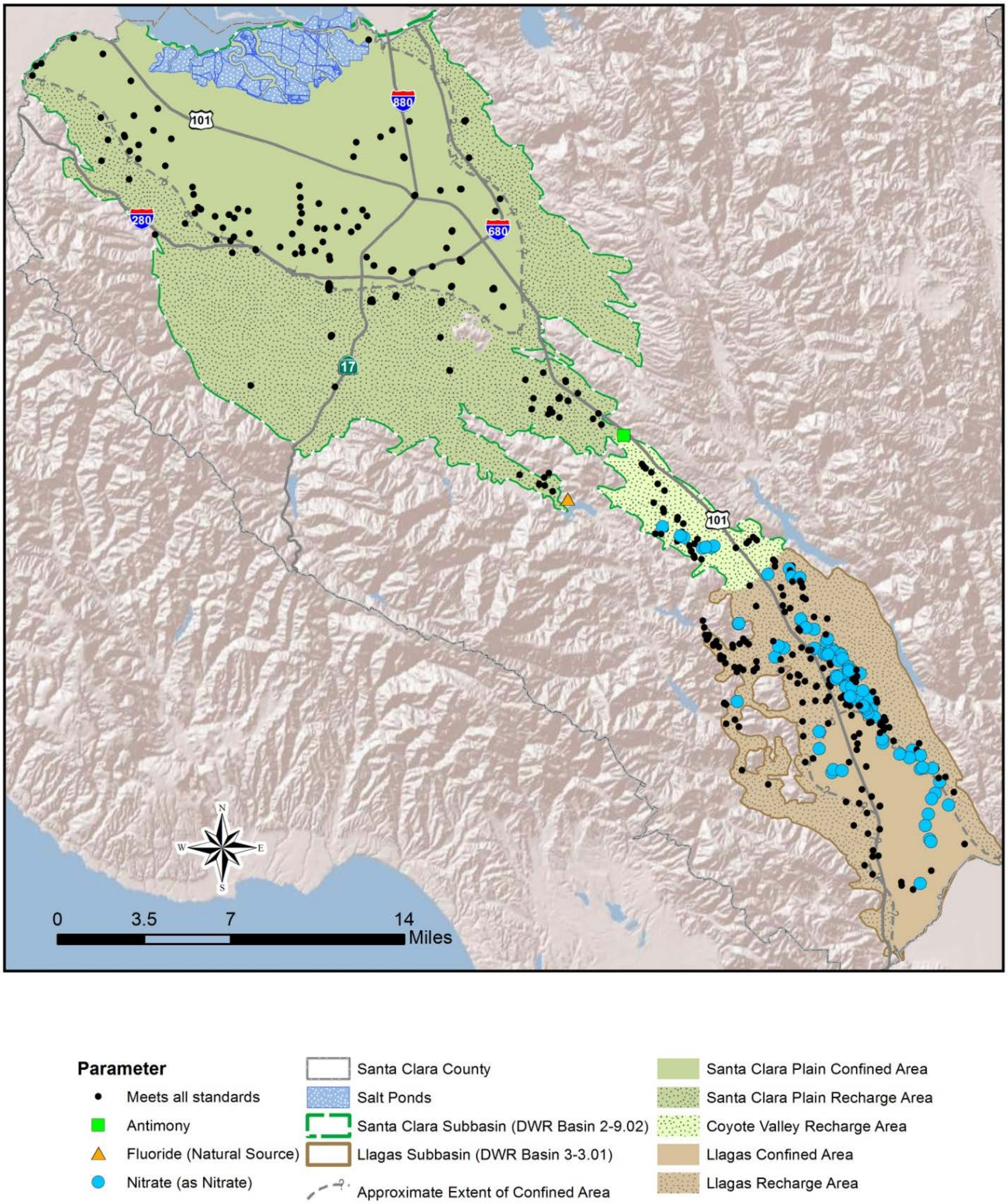
[18] Locus Technologies for Santa Clara Valley Water District, Recycled Water Irrigation and Groundwater Study, Santa Clara and Llagas Groundwater Subbasins, Santa Clara County, California, August 2011.

Figure 19 2012 Groundwater Quality Monitoring


880
101
280
680
17
101
N
W
E
S
0
5
10
20
Miles
Well Type
Monitoring
Domestic
Water Supply
Water Supply (Sampled by Public Water Suppliers)
Santa Clara County
Salt Ponds
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Approximate Extent of Confined Area
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

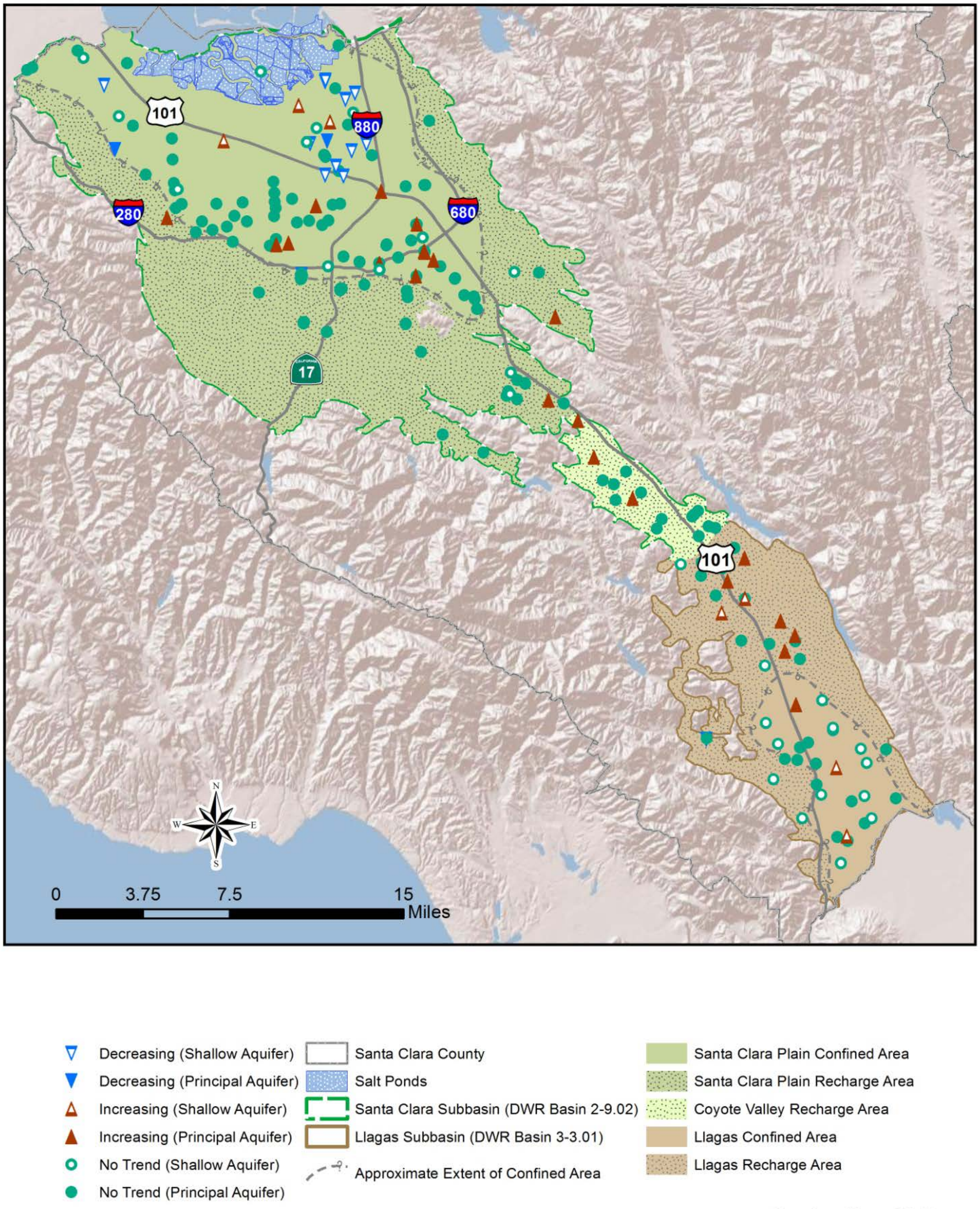
Santa Clara Valley
Water District

Figure 20 Water Supply Wells with Parameters above Primary Drinking Water Standards


101
880
280
680
17
101
N
W
E
S
0
3.5
7
14
Miles
Parameter
● Meets all standards
🟩 Antimony
▲ Fluoride (Natural Source)
● Nitrate (as Nitrate)
Santa Clara County
Salt Ponds
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Approximate Extent of Confined Area
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

Santa Clara Valley
Water District

Figure 21 Chloride Trends (1998 – 2012)


101
880
280
680
17
101
N
W
E
S
0
3.75
7.5
15
Miles
Decreasing (Shallow Aquifer)
Decreasing (Principal Aquifer)
Increasing (Shallow Aquifer)
Increasing (Principal Aquifer)
No Trend (Shallow Aquifer)
No Trend (Principal Aquifer)
Santa Clara County
Salt Ponds
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Approximate Extent of Confined Area
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

Santa Clara Valley Water District

Figure 22 Nitrate Trends (1998 – 2012)

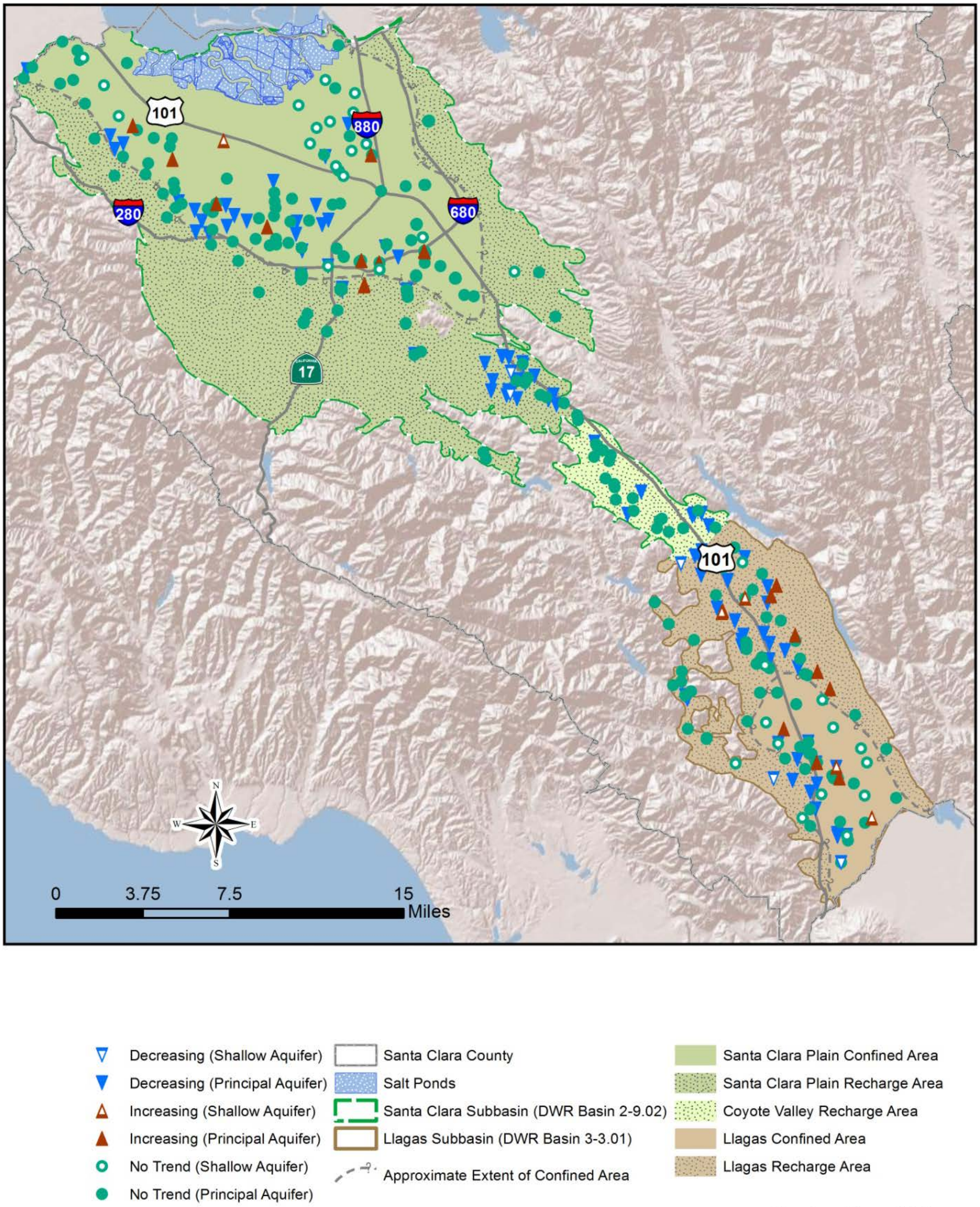
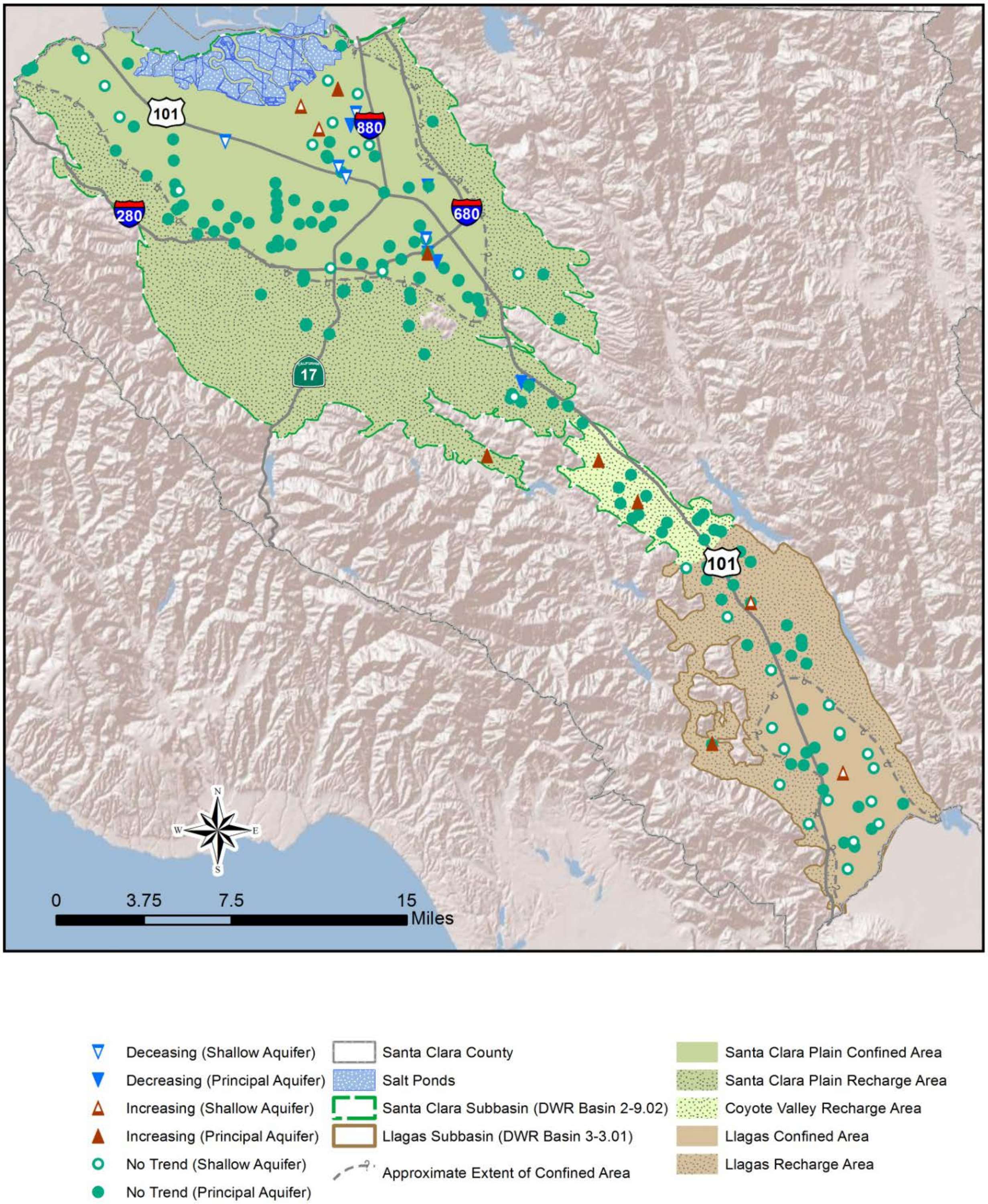
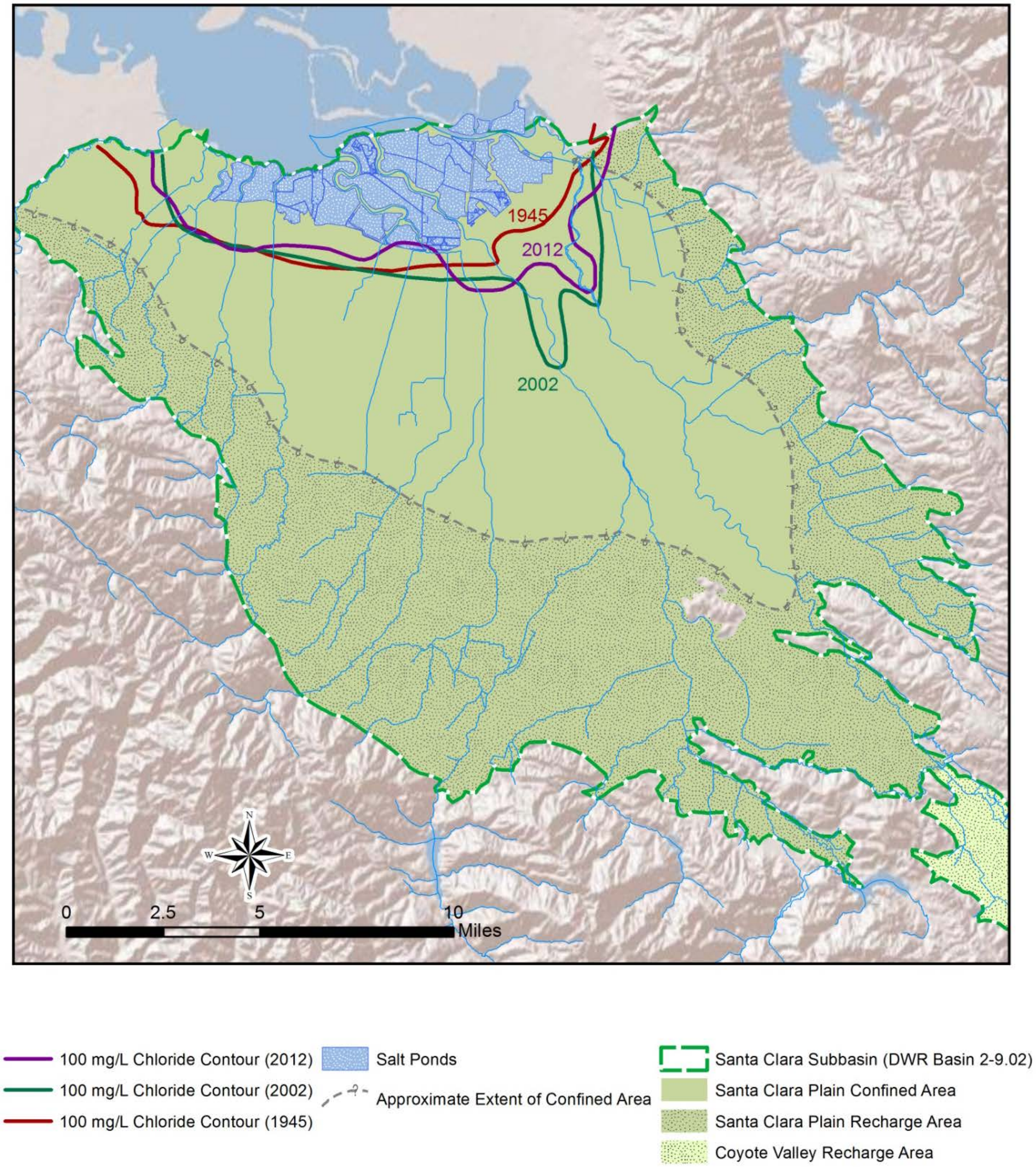

101
880
280
680
17
101
N
W
E
S
0
3.75
7.5
15
Miles
▽ Decreasing (Shallow Aquifer)
▼ Decreasing (Principal Aquifer)
△ Increasing (Shallow Aquifer)
▲ Increasing (Principal Aquifer)
○ No Trend (Shallow Aquifer)
● No Trend (Principal Aquifer)
Santa Clara County
Salt Ponds
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Approximate Extent of Confined Area
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

Figure 23 **Total Dissolved Solids (TDS) Trends (1998 – 2012)**


101
880
280
680
17
101
N
W
E
S
0
3.75
7.5
15
Miles
▽ Deceasing (Shallow Aquifer)
▼ Decreasing (Principal Aquifer)
△ Increasing (Shallow Aquifer)
▲ Increasing (Principal Aquifer)
○ No Trend (Shallow Aquifer)
● No Trend (Principal Aquifer)
Santa Clara County
Salt Ponds
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Approximate Extent of Confined Area
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

Santa Clara Valley
Water District

Figure 24 Salt Water Intrusion Conditions


1945
2012
2002
N
W
E
S
0
2.5
5
10
Miles
100 mg/L Chloride Contour (2012)
100 mg/L Chloride Contour (2002)
100 mg/L Chloride Contour (1945)
Salt Ponds
Approximate Extent of Confined Area
Santa Clara Subbasin (DWR Basin 2-9.02)
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area

Domestic Well Water Quality

In addition to regional monitoring to assess groundwater conditions, the District has implemented a basic water quality testing program that is available to eligible domestic well owners in Zones W-2 (North County) and W-5 (South County). In 2012, the District tested 19 domestic wells in North County and 220 wells in South County for common contaminants and water quality indicators including nitrate, bacteria, electrical conductivity, and hardness[19].

The collection of localized data at domestic wells helps improve the District's understanding of the occurrence of contaminants and provides important information to domestic well owners to help them better protect their health. The testing of private domestic wells is not mandated by state or local agencies, and as such, contaminants may go undetected for long periods of time. Water from private domestic wells is not regulated, but the comparison to drinking water standards provides context for results. Table 10 summarizes the results for each zone, including the median value and percent of wells above drinking water standards.

Nitrate was detected above the health-based MCL at 35% of domestic wells tested in South County, with a median concentration of 35.2 mg/L. This is higher than the regional median values for the Coyote Valley and Llagas Subbasin, which are 10.6 and 24 mg/L, respectively. The higher median in domestic wells may be due to different construction, as domestic wells are typically shallower. Public water systems also may have more flexibility in blending or switching sources when concentrations approach the MCL.

Countywide, total coliform bacteria were detected in 42% of the domestic wells tested. Coliform bacteria are naturally present in humans, animals, and the environment and do not normally cause illness, but they should not be present in drinking water. Escherichia coli (E. coli), a type of bacteria indicative of fecal contamination, were detected in 4% of the domestic wells tested countywide. Total coliform and E. coli detections were generally randomly distributed and no distinct spatial pattern was observed.

Wells tested near District groundwater recharge facilities showed lower levels of nitrate and a lower incidence of exceeding the MCL. About 17% of wells within 2,000 feet of a District recharge facility had nitrate levels above the MCL compared to 42% of wells tested in all other areas. This suggests that the District's managed recharge of high quality local and imported surface water is helping to reduce nitrate concentrations in groundwater.

District staff contacted well owners by phone if any parameters were present above health-based drinking water standards or if bacteria were present and information on contaminants, disinfection, and treatment options was offered. General information on the parameters tested was also provided with the laboratory results mailed to each well owner. Based on survey results, domestic well owners participating in the program were very satisfied with the testing program and the majority of well owners would like testing to be offered on an annual basis.

The continued presence of nitrate above the MCL in many domestic wells highlights the need for continued efforts to reduce well owners' exposure to nitrate. The District will begin to implement a multi-year rebate program for nitrate treatment systems in fiscal year 2014. That effort will complement outreach and other efforts to reduce nitrate loading in coordination with the Central Coast Water Board and basin stakeholders.

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[19] Santa Clara Valley Water District, Calendar Year 2012 Domestic Well Water Quality Monitoring Summary, May 2013.

Table 10 Summary of 2012 Domestic Well Testing Results

Parameter	MCL[1]	Zone W-2 North County		Zone W-5 South County	
		Median	Wells above MCL[1] (%)	Median	Wells above MCL[1] (%)
Nitrate (mg/L)	45 (P)	5.9	0%	35.2	35%
Fluoride (mg/L)	2 (P)	0.12	5%	0.11	0%
Electrical Conductivity (umhos/cm)	900 (S)	817	32%	688	14%
Sulfate (mg/L)	250 (S)	44.2	5%	34.4	<1%
Hardness (mg/L as CaCO3)	--	284	--	269	--
		Wells with Bacteria Present (No.)	Wells with Bacteria Present (%)	Wells with Bacteria Present (No.)	Wells with Bacteria Present (%)
Total Coliform Bacteria	--[2]	7	39%	93	42%
E. Coli Bacteria	--[2]	0	0%	10	5%

Notes:

1) Maximum contaminant levels are established by CDPH for public water systems. (P) indicates the parameter has a health-based primary MCL and (S) indicates a secondary, aesthetic-based MCL. Hardness does not have a primary or secondary MCL but water with hardness above 180 mg/L is classified as very hard. Water quality in domestic wells is not regulated.
2) Bacteria are measured as present or absent. Public water systems are required to ensure that fewer than 5% of samples have total coliform present and that no samples have E. Coli present.

Recharge Water Quality Summary

The District monitors water quality at selected in-stream and off-stream recharge facilities to characterize water quality and help ensure groundwater quality is not adversely impacted as a result of managed recharge. This allows the District to assess the need for changes in the groundwater monitoring programs and/or managed recharge program. This monitoring is conducted in accordance with the District's Recharge Water Quality Monitoring Plan[20] which recommends sampling each recharge system once every three years.

In 2012, the District monitored 24 stations in the Los Gatos, Penitencia, Lower Llagas, and Upper Llagas recharge systems (Table 11). The District's Water Quality Laboratory analyzed all samples for major and minor ions, and trace elements. Testing of organic compounds was also conducted for recharge facilities near potentially contaminating sources (e.g., industrial and automotive chemical sources or herbicide/pesticide application areas) to evaluate potential impacts from runoff.

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[20] Santa Clara Valley Water District, Recharge Water Quality Monitoring Plan, September 2012.

Table 11 Summary of 2012 Recharge Water Quality Sampling

Recharge System	Facilities Sampled
Los Gatos	Camden Ponds, Los Gatos Creek
Penitencia	Penitencia Creek, Penitencia Pond, Overfelt Pond, Silver Creek, Flint Creek
Upper Llagas	Main Avenue Ponds, San Pedro Ponds, Madrone Channel
Lower Llagas	Llagas Creek, Uvas Creek, Church Ponds

Water from recharge facilities is raw water that is not suitable for consumption, but the comparison to drinking water standards helps provide context for results. No parameters were detected above health-based drinking water standards in any of the recharge water samples. TDS, specific conductance, and manganese were present above aesthetic-based drinking water standards at Silver Creek, as was manganese in Llagas Creek. No volatile or semi-volatile organic compounds were detected in any samples.

Potential water quality impacts were evaluated by looking at key water quality indicators for salinity, runoff, and trace metals. The results for these indicators show that recharge water quality is generally very good (Table 12) and is typically similar to or better than the underlying groundwater quality. The managed recharge systems sampled do not appear to be impacted by salinity, runoff, or trace metals. The managed recharge water has relatively low levels of nitrate and salts, providing a high quality source of water to the groundwater basin that helps to dilute existing groundwater contaminants such as nitrate. There is some evidence of increased salinity in Silver Creek, which provides natural groundwater recharge but is not a managed recharge facility where the District releases water. Detailed results for the four recharge water quality sampling events in 2012 are summarized in a technical memorandum[21].

Table 12 2012 Recharge Water Quality Summary for Key Water Quality Indicators[1]

Recharge System	Alkalinity as $CaCO_3$	Aluminum	Chloride	Iron	Nitrate as NO_3	pH	Sulfate	TDS
Los Gatos	99	<20	50	25.9	0.2	7.88	37.40	231
Penitencia[2]	217	<20	81	<20	8.7	7.77	65.00	477
Upper Llagas	74	<20	69	<20	0.2	8.21	32.80	244
Lower Llagas	143	<20	13	22.8	2.6	7.28	26.35	220

Notes:

1) The value shown for each recharge system is the median concentration for all sampling events and facilities within that system. All concentrations are in milligrams per liter (mg/L) with the exception of pH (pH units).
2) The median values shown for the Penitencia system include Silver Creek and Flint Creek, which are not managed recharge facilities. Increased chloride, sulfate, and TDS at these creeks affect the median shown for the system.

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[21] Santa Clara Valley Water District, Calendar Year 2012 Recharge Water Quality Monitoring Summary, March 2013.

Monitoring near Recycled Water Irrigation Sites

The District has partnered with the four recycled water producers in the county[22] to expand recycled water use. Recycled water currently used undergoes tertiary treatment for non-potable uses like large landscape irrigation, agriculture, and industry. Tertiary treated recycled water generally has a higher concentration of salts, nutrients, disinfection by-products, and emerging contaminants than local groundwater or treated water[23]. These contaminants may be introduced to groundwater through landscape irrigation and previous studies near recycled water irrigation sites have noted evidence of a significant wastewater contribution to shallow wells[24].

In 2011, the District completed the Recycled Water Irrigation and Groundwater (RWIG) Study[25] which included a field study at a site using recycled water for irrigation. The study did not find significant changes in groundwater quality for most constituents following recycled water irrigation. However, several constituents were detected at low levels, including perfluorochemicals (PFCs) and NDMA, a disinfection by-product (DBP). The study findings suggested that best management practices and/or changes in recycled water treatment may be warranted in sensitive groundwater areas.

Since completing the RWIG study, the District has conducted basin-wide monitoring of NDMA, which was only detected above the reporting limit in one well (at trace levels, as summarized in the Groundwater Quality Summary section). The District is also working with South Bay Water Recycling (SBWR) to improve recycled water quality for irrigation and other uses. Existing tertiary treated water provided by SBWR will be blended with highly purified water from the Silicon Valley Advanced Water Purification Center, which will come online this summer. This facility will produce up to eight million gallons of highly purified water a year using microfiltration, reverse osmosis, and ultraviolet light.

To help ensure groundwater quality is protected, the District evaluates potential changes in groundwater quality near sites irrigated with tertiary treated recycled water. The District conducts monitoring and also evaluates data collected by others as shown in Table 13. The data District analyzes data collected using several methods including statistical analysis of trends and geochemical methods to evaluate changes in ionic composition.

As shown in Table 13, monitoring results at several sites show increasing trends for salts and low-level detections of NDMA, PFCs, and other constituents (which in many cases were not present prior to the use of recycled water). There is also some evidence that recycled water is mixing with shallow groundwater based on the ionic composition of groundwater, which appears to be shifting toward that of recycled water in several wells. Because many of the parameters monitored are common parameters found in groundwater, it is difficult to determine with certainty that the changes observed are due entirely to the application of recycled water. However, based on the lines of evidence mentioned here, it is likely that changes in shallow groundwater quality are occurring as a result of irrigation with recycled water.

---

[22] Recycled water is produced at the Palo Alto Regional Water Quality Control Plant, San Jose/Santa Clara Water Pollution Control Plant (WPCP), the Sunnyvale WPCP and the South County Regional Wastewater Authority.

[23] Advanced Recycled Water Treatment Feasibility Project, Black & Veatch, Kennedy/Jenks for the Santa Clara Valley Water District, August 2003.

[24] California GAMA Program: Fate and Transport of Wastewater Indicators: Results from Ambient Groundwater and from Groundwater Directly Influenced by Wastewater, Lawrence Livermore National Laboratory and California State Water Resources Control Board, June 2006.

[25] Locus Technologies for Santa Clara Valley Water District, Recycled Water Irrigation and Groundwater Study, Santa Clara and Llagas Groundwater Subbasins, Santa Clara County, California, August 2011.

In accordance with the State Board's Recycled Water Policy, the District is working with basin stakeholders to develop Salt and Nutrient Management Plans (SNMPs) for the Santa Clara and Llagas Subbasin. The State Board has identified the SNMPs as the appropriate way to address basin-wide salt and nutrient loading from all sources, including recycled water. The SNMPs will also address monitoring for emerging contaminants. The District will continue to monitor groundwater quality near recycled water irrigation sites to evaluate changes in water quality and will continue to work with stakeholders to identify ways to reduce contaminant loading.

Table 13 Summary of Groundwater Monitoring near Recycled Water Irrigation Sites

	2012 Sampling Summary	Key Findings
Integrated Device Technology Inc. (IDT) Monitoring **Sampling Agency:** IDT, District	**Location: Santa Clara Subbasin** 4 shallow monitoring wells at the IDT campus in the Edenvale area of San Jose **Frequency:** Semi-annual (March, September) **Parameters Analyzed:** Over 70 parameters including TDS, nutrients, ions, trace metals, DBPs, and emerging contaminants based on the RWIG Study	• Low levels of DBPs including NDMA have been detected in shallow wells since recycled water use began. • Increasing salinity trends are observed (chloride, bromide and TDS). • The water type for several wells appears to be shifting towards the recycled water signature, particularly for sodium, chloride, and bromide.
South Bay Water Recycling Groundwater Monitoring and Mitigation Program **Sampling Agency:** City of San Jose	**Location: Santa Clara Subbasin** 6 shallow and 6 deep wells in San Jose **Frequency:** Annual (March) **Parameters Analyzed:** 12 general water quality parameters including nitrate, TDS, metals, and ions	• The majority of shallow wells show increasing trends for sodium and chloride after the application of recycled water began, whereas they did not show any trend prior to its use. • The water quality parameters monitored are commonly found in groundwater so it is difficult to determine with certainty if increasing trends are due entirely to recycled water.
South County Recycled Water Monitoring **Sampling Agency:** District	**Location: Llagas Subbasin** 6 shallow wells and 1 deep well in Gilroy **Frequency:** Quarterly (Note, 4 wells were only sampled for 2 quarters in 2012 due to access issues) **Parameters Analyzed:** Over 70 parameters including TDS, nutrients, ions, trace metals, disinfection by-products (DBPs), and emerging contaminants based on the RWIG Study	• At one site near the SCRWA plant, the composition of groundwater differs from regional shallow groundwater and is similar to recycled water. • DBPs were detected in shallow groundwater at the two sites monitored including several trihalomethanes (THMs) and nitrosamines such as NDMA. • Perfluorochemicals (PFCs) have been detected in shallow groundwater.

The evaluation of 2012 groundwater quality data against GWMP outcome measures is summarized below. Additional discussion of all outcome measures, including planned action to address measures not being met, is presented in Section 8.

Groundwater Quality Outcome Measures

OM 2.1.1.e.
At least 95% of countywide water supply wells meet primary drinking water standards.

OM 2.1.1.f.
At least 90% of South County wells meet Basin Plan agricultural objectives.

OM 2.1.1.g.
At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids.

OM 2.1.1.e. is not met as only 82% of countywide water supply wells met all primary drinking water standards in 2012. Nitrate remains an ongoing groundwater protection challenge as nearly 30% of water supply wells tested in South County exceeded the primary MCL. Nearly all of these elevated levels occurred in domestic wells. With the exception of nitrate, the outcome measure would have been met as 99% of wells met all primary drinking water standards. Only two water supply wells had detections above drinking water standards for parameters other than nitrate in 2012 - one well in North County had elevated natural fluoride and one well in South County had antimony above the MCL.

OM 2.1.1.f. is met as 95% of all South County wells met Basin Plan agricultural objectives in 2012.

OM 2.1.1.g. is partially met. With regard to chloride, 89% of wells in both the shallow and principal aquifer zones had stable or decreasing concentrations. The measure is met for nitrate and total dissolved solids, for which 93% and 97% of wells had stable or decreasing concentrations, respectively.

8. Conclusions

This section summarizes groundwater conditions in 2012, presents all outcome measure results, and contains a discussion on expected conditions for the remainder of 2013.

Summary of 2012 Groundwater Conditions

Groundwater conditions were generally very good in 2012. Table 14 shows data for key indicators in 2012 as compared to 2011 and the last five years (2007 to 2011). Groundwater levels in 2012 were generally lower compared to 2011 and the previous five years due to dry conditions throughout most of the year. However, they remained well above historical lows and groundwater storage increased slightly in 2012. Managed recharge and pumping were slightly higher than the previous year, but pumping has decreased by over 10% over the last five years. Groundwater quality conditions were generally similar to the previous year and the last five years, with nitrate remaining the primary water quality challenge, particularly in South County.

Table 14 2012 Groundwater Conditions as Compared to Other Indices

Index[1]	2012	Compared to 2011	Compared to Last 5 Years (2007 - 2011)
Managed Recharge	96,700 AF	Up 3%	Up 2%
Groundwater Pumping	131,100 AF	Up 7%	Down 13%
Groundwater Levels[2]			
Santa Clara Plain	73.86 feet	Down 8%	Up 1%
Coyote Valley	261.36 feet	Down 2%	Down 2%
Llagas	208.17 feet	Down 10%	Down 5%
End of Year Groundwater Storage	357,500 AF	Up 1%	--
Land Subsidence[3]	-0.001 feet/year (net uplift)	Same	--
Groundwater Quality[4]			
Santa Clara Plain - TDS	395	Similar[5]	Similar
Coyote Valley - TDS	358	Similar	Similar
Llagas - TDS	340	Similar	Similar
Santa Clara Plain – Nitrate	12.4	Similar	Similar
Coyote Valley – Nitrate	10.6	Similar	Similar
Llagas - Nitrate	24	Similar	Similar

Notes:

1) Groundwater levels and quality are shown for three groundwater management areas: the Santa Clara Plain and Coyote Valley (which are part of the Santa Clara Subbasin) and the Llagas Subbasin.
2) Groundwater elevations at index wells represent October levels, which are typically the lowest levels of the year. The five-year average comparison considers all groundwater elevation readings within the period.
3) The water level at all subsidence index wells was above established thresholds throughout 2012, indicating a low risk of permanent subsidence.
4) Values shown represent median groundwater quality in mg/L for all principal aquifer zone wells tested. Nitrate values shown are nitrate (as NO_3).
5) Individual wells sampled for TDS and nitrate vary each year so a numeric comparison of median values is not shown. “Similar” indicates that the regional median values were within 20 mg/L for TDS and 3 mg/L for nitrate.

Outcome Measure Performance and Action Plan

The District's GWMP identified four outcome measures to assess whether basin management objectives are being accomplished. The measurement of recent data against these measures presented in previous sections of this report is summarized in Table 15 below, along with recommended actions to address measures not being met.

Table 15 Summary of Outcome Measure Performance and Action Plan

Groundwater Storage	• **OM 2.1.1.a.** Greater than 278,000 AF of projected end of year groundwater storage in the Santa Clara Plain. Projected end of 2013 Storage: 301,900 AF • **OM 2.1.1.b.** Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley. Projected end of 2013 Storage: 7,800 AF • **OM 2.1.1.c.** Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin. Projected end of 2013 Storage: 27,700 AF
Groundwater Levels and Subsidence	• **OM 2.1.1.d.** 100% of subsidence index wells with groundwater levels above subsidence thresholds. All ten subsidence index wells had groundwater levels above thresholds in 2012.
Groundwater Quality	• **OM 2.1.1.e.** At least 95% of countywide water supply wells meet primary drinking water standards. 82% of countywide water supply wells tested in 2012 met primary drinking water standards due to elevated nitrate in South County (mainly in domestic wells). If nitrate is not included, 99% of water supply wells met primary drinking water standards. • **OM 2.1.1.f.** At least 90% of South County wells meet Basin Plan agricultural objectives. 95% of wells met agricultural objectives. **Action Plan for OM 2.1.1.e:** • Implement rebate program for point of use nitrate treatment systems for domestic wells with elevated nitrate beginning in fiscal year 2014. • Continue to work with basin stakeholders to develop Salt and Nutrient Management Plans to address nitrate loading.
Groundwater Quality Trends	• **OM 2.1.1.g.** At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids. 89% of wells had stable or decreasing concentrations of chloride. 93% of wells had stable or decreasing concentrations of nitrate. 97% of wells had stable or decreasing concentrations of total dissolved solids (TDS). **Action Plan for OM 2.1.1.g:** • Continue to work with basin stakeholders to develop Salt and Nutrient Management Plans to address salt loading.

If dry conditions persist in the fall of 2013, it is expected that groundwater levels and storage will decline. Groundwater storage is the county's best local protection against droughts or water supply outages and has been critical in helping to meet the county's water supply needs during dry years such as 2013. The District will continue to conduct managed recharge operations and reduce demands on groundwater through treated water, water conservation, and recycling programs to ensure adequate groundwater supplies are available. The District will actively monitor groundwater levels, land subsidence, and water quality to support operational decisions and ensure groundwater resources are protected. The District will also continue to track proposed legislation, policies, and regulatory standards that may impact groundwater resources or the District's ability to manage them. For example, the District will closely follow regulatory developments related to chromium-6 including the expected release of a draft drinking water standard in August 2013.

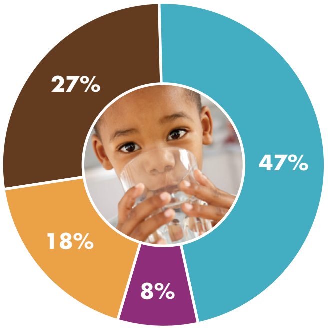
Appendix A – 2012 Groundwater Quality Summary Provided to Well Owners

Santa Clara Valley Water District

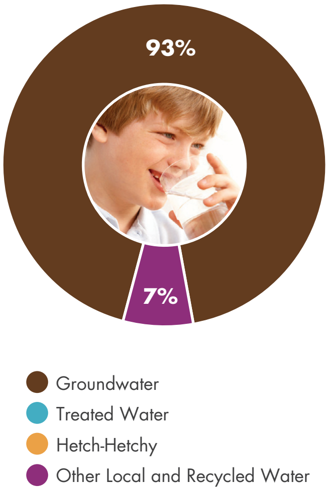
Groundwater Quality Summary Report

For testing performed in 2012

NORTH COUNTY WATER USE



SOUTH COUNTY WATER USE



Safeguarding our groundwater

Groundwater is an essential local resource, providing about half of the water used in Santa Clara County each year. In some areas, groundwater is the only source of drinking water. Protecting our groundwater helps ensure adequate supplies are available now and in the future.

The water district works to safeguard groundwater by:

- Replenishing groundwater with local and imported surface water.
- Reducing demands on groundwater through the delivery of treated water and with water conservation and recycling.
- Monitoring groundwater and implementing programs to protect against contamination.

We all have a role in protecting groundwater. Well owners should make sure wells are properly constructed and maintained and should create a zone of protection around the well See the water district's Guide for the Private Well Owner at **www.valleywater.org** for helpful tips. Residents can help by conserving water and by raising awareness that we live on top of our drinking water. Protect your water by teaching your family, friends, and neighbors:

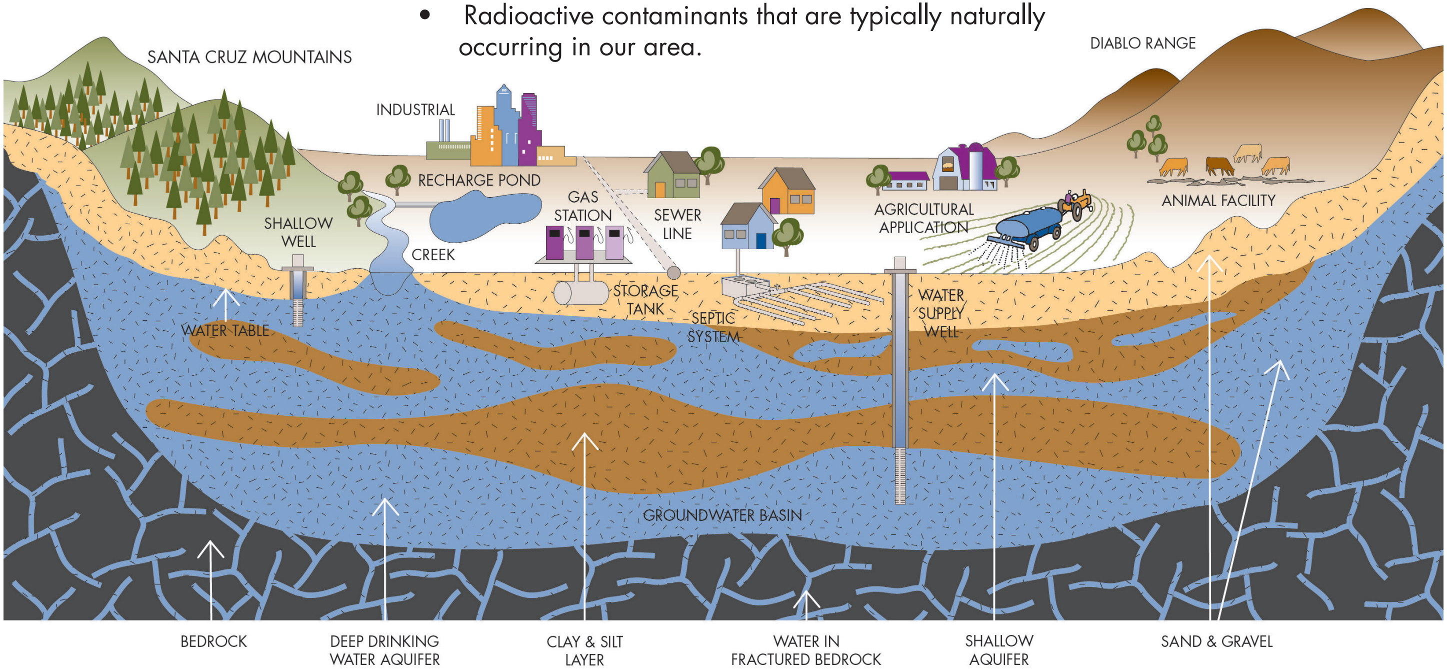
"If you don't want to drink it, don't put it on or in the ground!"

How does groundwater become contaminated?

As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and in some cases, radioactive material, and can pick up substances resulting from the presence of animals and human activities.

Contaminants that may be present include:

- Microbial contaminants such as viruses and bacteria that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
- Inorganic contaminants such as salts and metals that can be naturally occurring or result from stormwater runoff, industrial or domestic wastewater discharges, animal facility waste generation, mining or farming.
- Pesticides, fertilizers and herbicides that may come from a variety of sources such as agriculture, stormwater runoff and residential uses.
- Organic chemical contaminants including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production and can also come from gas stations, stormwater runoff, agricultural application and septic systems.
- Radioactive contaminants that are typically naturally occurring in our area.



Appendix A :: 2012 Groundwater Quality Summary

Groundwater monitoring confirms water is generally of high quality

As part of our comprehensive groundwater management efforts, the water district sampled over 240 domestic water supply wells and evaluated data collected at over 225 wells by local water suppliers in calendar year 2012. The table below summarizes these groundwater quality results for North County and South County (see map on back page). The 2012 results show that nearly all wells tested meet drinking water standards. The primary exception is nitrate, which is an ongoing groundwater protection challenge.

Water quality standards, including Maximum Contaminant Levels (MCLs), are shown to provide context for the results. Water from public water systems must meet MCLs, but domestic wells are not subject to these standards. It should be noted that not every well was tested for all parameters shown and only parameters that were detected are listed. This is a regional summary and may not reflect the water quality in your well since every property and well is unique.

Primary Drinking Water Standards- Public Health Related Standards

				NORTH COUNTY		SOUTH COUNTY		
INORGANIC CONTAMINANTS	UNITS	PRIMARY MCL	PHG	MEDIAN	RANGE	MEDIAN	RANGE	Typical Sources
Aluminum	ppb	1,000	600	35.8	ND - 940	26.2	ND - 150	Erosion of natural deposits; residue from some surface water treatment processes
Antimony	ppb	6	20	ND	ND	ND	ND - 7	Discharge from industrial processes; fire retardants; ceramics; electronics; solder
Arsenic	ppb	10	0.004	ND	ND - 3	ND	ND - 5	Erosion of natural deposits; glass and electronics production waste
Asbestos	MFL	7	7	NA	NA	0.56	ND - 2.1	Erosion of natural deposits
Barium	ppb	1,000	2,000	120	ND - 270	117	ND - 230	Erosion of natural deposits
Chromium (total)	ppb	50	–	5.1	ND - 14	2.6	ND - 8	Erosion of natural deposits; metal plating
Fluoride (natural source)	ppm	2	1	0.15	ND - 3.86	0.12	ND - 0.48	Erosion of natural deposits
Nickel	ppb	100	12	ND	ND - 2.81	2.58	ND - 6.82	Erosion of natural deposits; discharge from metal industries
Nitrate (as NO3)	ppm	45	45	13	ND - 40	30	ND - 163	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Nitrate + Nitrite (as N)	ppm	10	10	3.7	0.62 - 9.1	3.1	1.9 - 5.2	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Perchlorate	ppb	6	6	ND	ND	ND	ND - 5.8	Solid rocket propellant, fireworks, explosives, flares, matches, and a variety of industries
Selenium	ppb	50	30	ND	ND - 6	ND	ND	Erosion of natural deposits
RADIOACTIVE CONTAMINANTS								
Gross Alpha	pCi/L	15	–	1.8	ND - 5.5	2	ND - 7.8	Erosion of natural deposits
Gross Beta[1]	pCi/L	4 mrem/yr	–	ND	ND	ND	ND - 4.6	Erosion of natural deposits
VOLATILE ORGANIC CHEMICALS								
1,1,1-Trichloroethane (1,1,1-TCA)	ppb	200	1,000	ND	ND - 3.3	ND	ND	Discharge from metal degreasing sites and other industrial processes
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	ppb	1,200	4,000	ND	ND - 13	ND	ND	Discharge from metal degreasing sites and other industrial processes; drycleaning solvent; refrigerant
1,1-Dichloroethene (1,1-DCE)	ppb	6	10	ND	ND - 5.2	ND	ND	Discharge from industrial processes
1,2-Dichloropropane	ppb	5	0.5	ND	ND	ND	ND - 1.1	Discharge from industrial processes, primary component of some fumigants
Tetrachloroethene (PCE)	ppb	5	0.06	ND	ND	ND	ND - 2	Discharge from industrial processes, dry cleaners, and automotive repair
Total Trihalomethanes (THM)	ppb	80	–	ND	ND - 0.8	ND	ND	Byproduct of drinking water disinfection
MICROBIOLOGICAL CONTAMINANTS[2]				Present	Absent	Present	Absent	Typical Sources
Total Coliform Bacteria				7	11	94	136	Naturally present in the environment
E. Coli Bacteria				0	18	10	220	Human and animal fecal waste

Notes:
1) Gross beta has an MCL of 4 mrem/year, but is measured in pCi/L. The CA Dept. of Public Health requires additional testing by public water systems when gross beta is above 50 pCi/L.
2) The table shows the number of domestic wells tested that had bacteria present or absent. Public water systems are required to ensure that fewer than 5% of samples have total coliform present and that no samples have e.coli present. Domestic wells are not subject to these standards.

Terms and Definitions

Color units: A measure of color in water

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in public water systems. Primary MCLs are set as close to PHGs as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.

Median: The "middle" value of the data, with half of the values above the median value and half of the values below the median value.

MFL: Million Fibers per Liter

uS/cm: microSiemens per centimeter (a measure of the dissolved inorganic salt content)

mrem/yr: millirems per year (a measure of radiation)

NA: Not Analyzed

ND: Not Detected (at laboratory testing limit)

NTU: Nephelometric Turbidity Units

pCi/L: picocuries per liter (a measure of radiation)

ppm: parts per million (milligrams per liter)

ppb: parts per billion (micrograms per liter)

ppt: parts per trillion (nanograms per liter)

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to human health. PHGs are set by the California EPA.

TON: Threshold Odor Number

Appendix A :: 2012 Groundwater Quality Summary

				NORTH COUNTY		SOUTH COUNTY		
Secondary Drinking Water Standards - Aesthetic Standards	UNITS	SECONDARY MCL	PHG	MEDIAN	RANGE	MEDIAN	RANGE	**Typical Sources**
Chloride	ppm	250	–	45	20 - 100	39	18 - 100	Runoff/leaching from natural deposits; seawater influence
Color	color units	15	–	ND	ND - 8	ND	ND	Naturally-occuring organic materials
Copper	ppb	1,000	300	ND	ND - 5.3	1.8	ND - 6.7	Internal corrosion of household plumbing systems; erosion of natural deposits
Foaming Agents (MBAS)	ppb	500	–	ND	ND - 0.076	ND	ND - 0.072	Municipal and industrial waste discharges
Iron	ppb	300	–	136	ND - 1,300	29.9	ND - 680	Leaching from natural deposits; industrial wastes
Manganese	ppb	50	–	12.1	ND - 210	6.1	ND - 63.2	Leaching from natural deposits; industrial wastes
Odor Threshold	TON	3	–	ND	ND - 2	ND	ND - 1	Naturally-occuring organic materials
pH	pH units	6.5 - 8.5	–	7.43	6.59 - 8.20	7.58	6.17 - 8.30	Carbon dioxide emissions; rainfall; erosion of natural deposits
Specific Conductance	uS/cm	900	–	670	425 - 1,870	668	397 - 1,640	Substances that form ions when in water; seawater influence
Sulfate	ppm	250	–	41	ND - 272	34.7	7.4 - 251	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids (TDS)	ppm	500	–	405	290 - 750	358	236 - 622	Runoff/leaching from natural deposits
Turbidity	NTU	5	–	0.25	ND - 10.3	0.66	ND - 2.6	Soil runoff
Zinc	ppb	5,000	–	281	ND - 760	11.2	ND - 160	Runoff/leaching from natural deposits; industrial wastes
Other Water Quality Parameters								
Alkalinity (total, as CaCO3)	ppm	–	–	225	130 - 370	190	120 - 370	Atmospheric and vadose zone carbon dioxide
Bicarbonate (as CaCO3)	ppm	–	–	282	144 - 282	206	144 - 351	Atmospheric and vadose zone carbon dioxide
Bicarbonate (as HCO3)	ppm	–	–	275	160 - 450	230	150 - 450	Atmospheric and vadose zone carbon dioxide
Boron	ppb	–	–	138	114 - 388	121	ND - 1,120	Erosion of natural deposits
Bromide	ppm	–	–	0.13	ND - 0.54	0.15	ND - 0.81	Seawater intrusion and sea spray
Calcium	ppm	–	–	68	40 - 110	52	18 - 105	Erosion of natural deposits
Calcium (as CaCO3)	ppm	–	–	186	121 - 193	141	57 - 262	Erosion of natural deposits
Carbon Dioxide	ppm	–	–	14	3 - 130	NA	NA	Atmospheric sources; dissolution of carbonate rocks
Chromium-6 (Hexavalent)	ppb	–	0.02	2	ND - 3.6	NA	NA	Erosion of natural deposits; metal plating and industrial discharges
Hardness (total, as CaCO3)	ppm	–	–	290	22 - 585	266	ND - 589	Erosion of natural deposits
Lead	ppb	–	0.2	ND	ND - 17	ND	ND	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits
Lithium	ppb	–	–	ND	ND - 19	9.9	ND - 34	Erosion of natural deposits; metal plating and industrial discharges
Magnesium	ppm	–	–	27	14 - 48	33	8.7 - 68	Erosion of natural deposits
N- Nitrosodiethylamine (NDEA)	ppt	–	–	ND	ND	ND	ND - 1.7	Byproduct of drinking water disinfection
N-Nitrosodimethylamine (NDMA)	ppt	–	3	ND	ND - 1.0	ND	ND	Byproduct of drinking water disinfection
N- Nitrosodi-n-butylamine (NDBA)	ppt	–	–	ND	ND - 1.8	ND	ND - 6.2	Byproduct of drinking water disinfection
Orthophosphate	ppm	–	–	0.06	ND - 0.9	ND	ND - 0.5	Leaching from natural deposits; agricultural runoff
Potassium	ppm	–	–	1.3	1.1 - 2.8	1.4	ND - 2	Erosion of natural deposits
Radium 228	pCi/L	–	0.019	NA	NA	0.47	0.22 - 1.3	Erosion of natural deposits
Silica	ppm	–	–	21.3	19.9 - 29.5	27.4	19.9 - 58.2	Erosion of natural deposits
Sodium	ppm	–	–	30	17 - 170	27	16 - 113	"Sodium" refers to the salt present in the water and is generally naturally-occuring
Vanadium	ppb	–	–	ND	ND	ND	ND - 11	Erosion of natural deposits; discharge from industrial uses

Do I need to test my water?

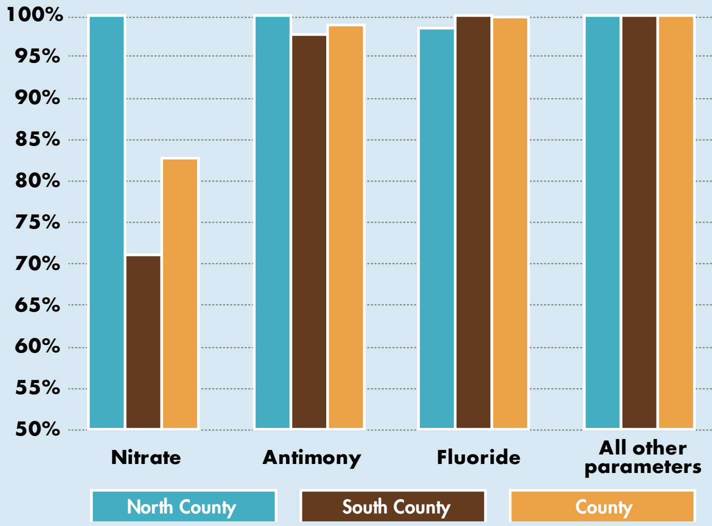
If your water comes from a public water supply, such as a city or water company, it is tested regularly to make sure that it meets state and federal drinking water standards.

If your water comes from a private well, you are responsible for making sure it is safe to drink. Although the water district monitors regional groundwater quality, every property and well has unique conditions. Some contaminants are colorless and odorless, so the surest way to protect your health is to have your water tested.

The water district encourages private well owners to have their well water tested by a state-certified laboratory annually or more often if there is a change in taste, odor or appearance. If your water contains any contaminant above drinking water standards, you may want to install a treatment system or use an alternative source of water.

The water district is currently offering free basic water quality testing for eligible domestic wells — call the Groundwater Hotline at **(408) 630-2300** to find out more.

PERCENTAGE OF WATER SUPPLY WELLS TESTED IN 2012 MEETING PRIMARY DRINKING WATER STANDARDS



Current Water Quality Issues

Perchlorate

Perchlorate is salt that is used for rocket fuel, highway flares, fireworks and other uses. Perchlorate can have adverse health effects at high levels as it can interfere with the thyroid gland, which can affect hormones that regulate metabolism and growth.

Contamination from a former highway flare manufacturer in Morgan Hill was first discovered in 2000. At the urging of the water district and the community, the Central Coast Regional Water Quality Board has taken timely action to restore groundwater quality.

Due to cleanup activities and groundwater recharge, perchlorate levels have decreased significantly. The plume is also getting smaller, now approximately extending from Tennant Avenue south to the San Martin Airport area. A few water supply wells still contain perchlorate above the drinking water standard and remediation by the responsible party is ongoing.

Nitrate

Common sources of nitrate are fertilizers, septic systems and livestock waste, so nitrate is often higher in rural and agricultural areas. As shown in the chart to the left, nitrate is an ongoing groundwater protection challenge, particularly in South County.

Nitrate can interfere with the blood's ability to transport oxygen and is of greatest concern for infants and pregnant women. The effects of consuming high levels of nitrate are often referred to as "blue baby syndrome" and symptoms include shortness of breath and blueness of the skin.

The water district monitors nitrate to assess hot spots and trends, recharges groundwater to dilute nitrate, and works with other agencies to address elevated nitrate in groundwater.

Chromium-6

Chromium-6 is a naturally occurring metal that is also used in several industrial processes. California has a drinking water standard of 50 parts per billion (ppb) for total chromium, but does not yet have a standard for chromium-6. In 2011, California released a public health goal of 0.02 ppb for drinking water. This completes the first step in the rigorous process of developing a drinking water standard for chromium-6, which is a suspected carcinogen.

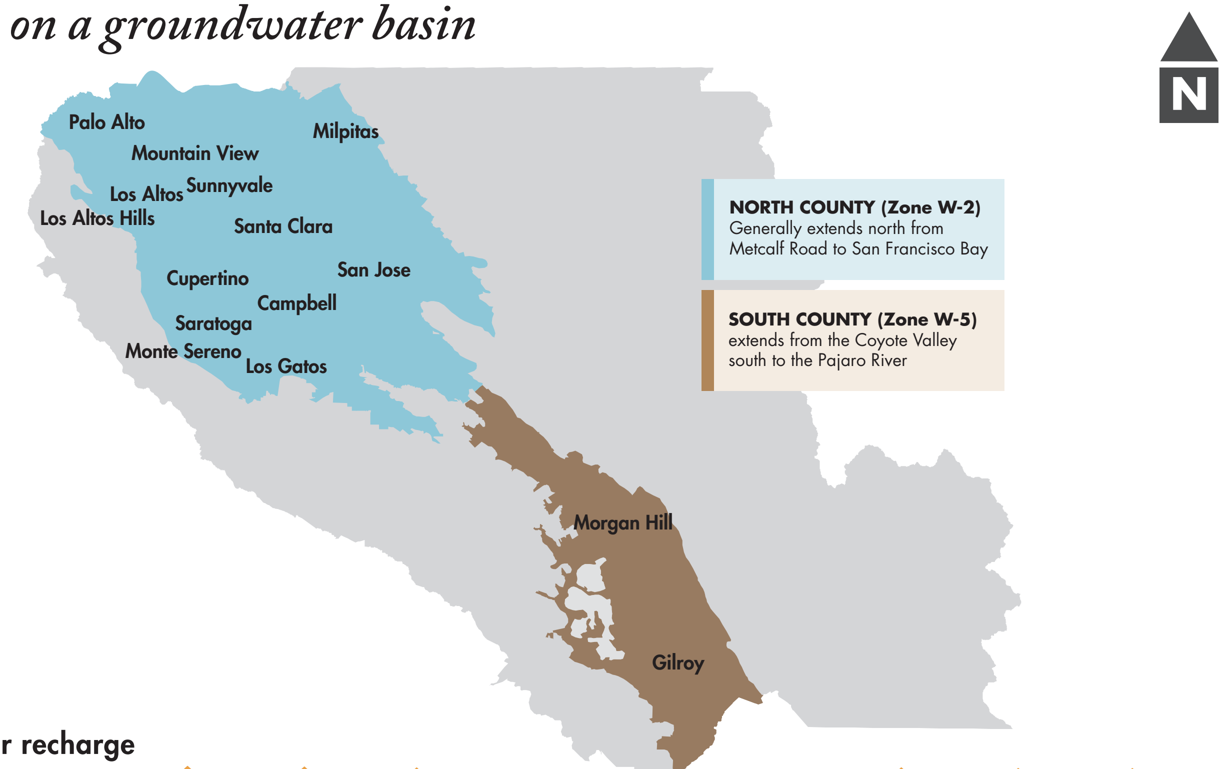
The water district actively tracks new scientific research related to drinking water and we are fully engaged in the state and federal process to develop a chromium-6 drinking water standard.

Antimony and Fluoride

Antimony may be present in water due to industrial discharges while fluoride typically occurs naturally. Some people who drink water with excess antimony over many years may have increased cholesterol or decreased blood sugar, while consumption of excess fluoride may result in mottled teeth or bone disease.

Appendix A :: 2012 Groundwater Quality Summary

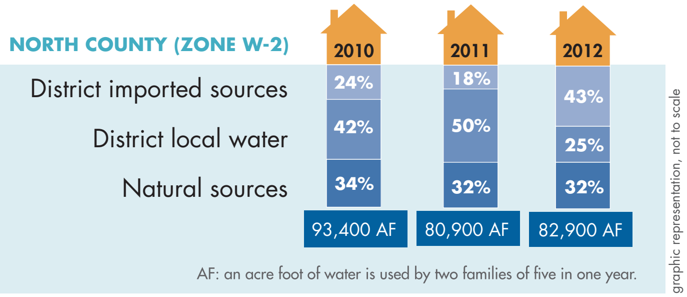
You live on a groundwater basin



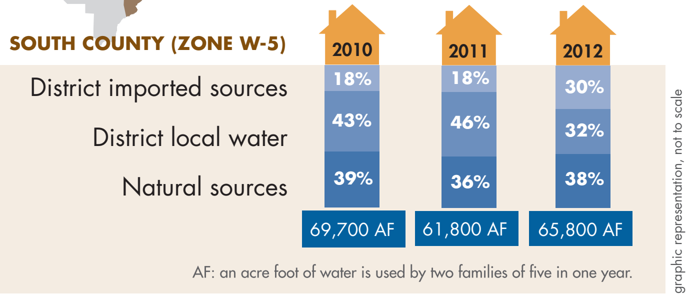
NORTH COUNTY (Zone W-2)
Generally extends north from
Metcalf Road to San Francisco Bay

SOUTH COUNTY (Zone W-5)
extends from the Coyote Valley
south to the Pajaro River

Groundwater recharge



AF: an acre foot of water is used by two families of five in one year.



AF: an acre foot of water is used by two families of five in one year.

Health and education information

Drinking water, including bottled water, may reasonably be expected to contain small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the United States Environmental Protection Agency's Safe Drinking Water Hotline at **1-800-426-4791**. You can obtain additional health information on the California Department of Public Health website at **www.cdph.ca.gov** or by consulting your healthcare provider.

ACCESS VALLEY WATER

For more information, visit our website at **valleywater.org** and use our Access Valley Water customer request and information system. With three easy steps, you can use this service to submit questions, complaints or compliments directly to a water district staff person.

If you have questions or concerns about this report, please contact the water district's Groundwater Hotline at: **(408) 630-2300**.

Appendix B – 2012 Groundwater Quality Results by Subbasin and Zone

Table B-1 Summary of 2012 Water Quality Indicator Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley				Llagas Subbasin								Maximum Contaminant Level	
		Shallow Zone[2]				Principal Zone[3]								Shallow Zone				Principal Zone					
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
Aggressive Index (Corrosivity)	Index	--	--	--	--	35	<2	12	13	4	11.84	11.99	12.13	--	--	--	--	17	11.91	12	13	--	--
Alkalinity (Total, as CaCO3)	mg/L	19	171	300	589	78	100	210	370	14	150	223	348	21	106	199	342	45	43	190	370	--	--
Alkalinity- Bicarbonate (as CaCO3)	mg/L	19	171	300	589	37	100	197	355	10	163	217	348	21	106	199	342	28	<5	197.5	351	--	--
Alkalinity- Carbonate (as CaCO3)	mg/L	19	<5	<5	33	37	<5	<5	<5	10	<5	<5	<5	21	<5	<5	<5	28	<5	<5	55	--	--
Alkalinity- Hydroxide (as CaCO3)	mg/L	19	<5	<5	<5	37	<5	<5	<5	10	<5	<5	<5	21	<5	<5	<5	28	<5	<5	12	--	--
Caffeine	ug/L	--	--	--	--	8	<0.05	<0.05	<0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbonate Alkalinity	mg/L	19	<5	<5	20	68	<2	<2	2.7	14	<5	<5	<5	20	<5	<5	<5	29	<5	<5	33	--[9]	--
Color	Units	--	--	--	--	31	<3	<5	8	6	<3	<5	<5	--	--	--	--	1	<5	<5	<5	--	15
E Coli	P/A	1	Absent			--	--	--	--	6	All Absent			1	Present			8	All Absent			--	--
Foaming Agents (MBAS)	ug/L	--	--	--	--	31	<0.05	<0.05	0.076	4	<0.05	<0.05	0.072	--	--	--	--	1	<0.05	<0.05	<0.05	--	500
Hardness (Total) as CaCO3	mg/L	--	--	--	--	41	160	290	380	11	123	263	315	4	321	321	400	37	151	250	589	--	--
Hydroxide Alkalinity	mg/L	19	<5	<5	<5	68	<1	<5	<10	14	<1	<5	<5	20	<5	<5	<5	29	<1	<5	<5	--	--
Langelier Index @ 60 C	Index	--	--	--	--	14	0.46	1	1.6	--	--	--	--	--	--	--	--	16	-0.1	0.55	0.88	--	--
Langelier Index at Source Temp	Index	--	--	--	--	23	-0.93	-0.16	11.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Odor Threshold @ 60 C	Ton	--	--	--	--	31	<1	<1	2	5	<1	<1	1	--	--	--	--	2	<1	<1	1	--	3
pH	pH Units	19	6.63	7.4	8.34	93	6.54	7.5	8.27	14	6.49	7.36	7.84	21	6.93	7.08	9.76	42	6.17	7.7	10.31	--	6.5 – 8.5
Source Temperature C	C	19	16.4	19.5	20.7	37	15.72	19.5	27.1	10	16.3	18.5	20.52	21	15.4	18.3	19.9	25	10.4	18.7	27.2	--	--
Specific Conductance[10]	uS/cm	19	468	870	1600	81	355	648	4411	19	403	631	1157	22	296	671	1570	56	397	609	2700	--	900 (1,600)
Total Coliform	P/A	1	Absent			--	--	--	--	6	4 Absent, 2 Present			1	Present			8	6 Absent, 2 Present			--[9]	--
Turbidity[10]	NTU	19	0	0.45	87.6	71	-0.1	0.23	10.3	15	<0.1	0.5	10.1	21	0	0.84	9	30	0	0.72	5.72	--	5

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Dept. of Public Health (CDPH).

Only wells with known construction information are presented in this table. CDPH wells are assumed to represent the principal zone if no construction information is available as these are typically deep wells.

1. mg/L = milligrams per liter; uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units; TON = Threshold Odor Number
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results in 2012 for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results reported at multiple reporting limits, the median was computed using the Maximum Likelihood Estimate (MLE) method. In these cases, the upper bound of the estimate is presented.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per California Department of Public Health or US EPA. For SMCLs having a range, the lower, recommended
9. A public water system collecting fewer than 40 samples per month is in violation of the total coliform MCL if more than one sample is total coliform positive or if there is a repeat positive for
10. Summary statistics computed from combined laboratory and field measured data.

Table B-2 Summary of 2012 Inorganic Constituent Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley				Llagas Subbasin								Maximum Contaminant Level	
		Shallow Zone[2]				Principal Zone[3]								Shallow Zone				Principal Zone					
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
MAJOR AND MINOR IONS																							
Bicarbonate (as HCO3)	mg/L	19	209	366	718	78	122	260	450	14	190	273	425	20	130	271	418	45	<5	230	450	--	--
Bromide	mg/L	19	<0.05	0.18	0.6	38	<0.05	0.11	6.88	14	<0.05	0.1	0.36	21	<0.05	0.1	0.39	36	<0.05	0.12	3.04	--	--
Calcium	mg/L	19	9.4	87.8	152	78	11.8	61	190	14	7	37.4	69	21	31.5	56.4	105	45	3.9	53.3	137	--	--
Calcium (as CaCO3)	mg/L	19	23.5	219	380	37	29.4	131	475	10	17.4	116	173	21	78.6	141	264	28	9.7	140	342	--	--
Carbon Dioxide	mg/L	--	--	--	--	30	3	14	130	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	mg/L	19	19	60	99	78	10	45	1,310	14	19	36	139	21	9	45	180	45	16	35	823	--	250 (500)
Cyanide	mg/L	--	--	--	--	43	<100	<100	<100	5	<100	<100	<100	--	--	--	--	17	<100	<100	<100	150	--
Fluoride (Natural Source)	mg/L	19	<0.1	0.11	0.49	82	<0.05	0.12	0.56	19	0.07	0.13	0.2	22	0.05	0.1	0.26	54	<0.1	0.12	0.29	2	--
Magnesium	mg/L	19	11.8	41.4	81.8	78	6.8	21	56	14	13	32	66	21	16.4	37.1	62.6	45	<0.5	29.8	68	--	--
Perchlorate	mg/L	19	<4	<4	<4	92	<4	<4	<4	16	<4	<4	5.8	21	<4	<4	<4	49	<4	<4	5.8	6	--
Potassium	mg/L	19	0.7	1.5	5.3	68	0.6	1.4	4.4	14	<1	1.4	1.8	21	<0.5	1	1.8	29	<0.5	1.5	36.3	--	--
Silica	mg/L	19	6.2	24.2	34.7	37	19.3	26.3	39.7	10	19.9	23.8	36.1	21	17.3	26.9	58.2	28	5.6	27.1	45.1	--	--
Sodium	mg/L	19	24.7	46.4	189	78	16.6	34.5	636	14	19	28.3	117	21	14.3	28.3	112	45	16	28.7	326	--	--
Sodium Adsorption Ratio (adj)	--	--	--	--	--	--	--	--	--	14	0.6	0.88	3.36	21	0.43	0.84	2.64	45	0.5	0.9	5.46	--	--
Sulfate	mg/L	19	<0.5	62	310	78	<0.5	41	86	14	1.5	36	56.3	21	18.2	40	107	53	3.3	35	63	--	250 (500)
Total Filterable Residue 180 C (TDS)	mg/L	19	286	520	958	78	174	395	2,520	16	236	358	630	21	218	422	798	45	180	340	1,800	--	500 (1,000)
NUTRIENTS																							
Nitrate (as NO3)	mg/L	20	<0.05	3.3	36.7	188	<1	12.4	45.6	31	<2	10.6	58	21	0.096	40.5	129	75	<2	24	163	45	--
Nitrate + Nitrite (As N)	mg/L	--	--	--	--	29	0.62	3.7	9.1	4	1.9	3.9	5.2	--	--	--	--	1	1.9	1.9	1.9	10	--
Nitrite (as N)	ug/L	--	--	--	--	44	<200	<400	<400	7	<400	<400	<400	--	--	--	--	23	<400	<400	<400	1,000	--
Phosphate- Ortho	mg/L	19	<0.05	0.13	0.84	37	<0.05	0.11	1.85	14	<0.05	0.08	0.46	21	<0.05	0.07	0.2	39	<0.05	0.07	0.5	--	--
TRACE ELEMENTS																							
Aluminum	ug/L	19	<20	<20	450	81	<50	20.4	940	16	<20	44	300	21	<20	<20	140	46	<50	21	160	1,000	200
Antimony	ug/L	19	<2	<2	<2	79	<2	<6	<6	15	<2	<2	7	21	<2	<2	<2	47	<2	<2	<6	6	--
Arsenic	ug/L	19	<2	<2	12	79	<2	<2	12	15	<2	<2	5	21	<2	<2	<2	46	<2	<2	6	10	--
Asbestos	MFL	--	--	--	--	--	--	--	--	1	<0.2	<0.2	<0.2	--	--	--	--	1	<0.2	0.77	2.1	7	--
Barium	ug/L	19	33.9	100	210	79	<100	120	430	15	<100	100	410	21	11.7	110	370	46	<100	118	1,000	1,000	--
Beryllium	ug/L	19	<1	<1	<1	79	<1	<1	<1	15	<1	<1	<1	21	<1	<1	<1	47	<1	<1	<1	4	--
Boron	ug/L	19	97.1	212	1,340	37	64.7	150	3,850	10	<50	127	1,120	21	<50	112	343	29	<50	109	222		--
Cadmium	ug/L	19	<1	<1	<1	79	<1	<1	<1	15	<1	<1	<1	21	<1	<1	<1	46	<1	<1	<1	5	--
Chromium (Total)	ug/L	19	<1	<1	5.25	80	<1	1.9	14	15	2.38	3.8	5.42	21	<1	3.48	7.97	45	<1	2.6	5.62	50	--
Chromium-6 (Hexavalent)	ug/L	--	--	--	--	2	<1	2	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/L	3	<2	<2	<2	15	<2	<2	<2	10	<2	<2	<2	20	<2	<2	<2	20	<2	<2	<2	--	--
Copper	ug/L	19	<2	<2	8.5	37	<2	<2	5.31	10	<2	<2	6.7	21	<2	<2	4.85	45	<2	<2	5.524	--	1,000
Iron	ug/L	19	<20	<20	3,400	94	<100	40.5	1,300	15	<20	65	370	21	<20	<20	180	46	<20	55	1,100	--	300
Lead	ug/L	19	<2	<2	<2	74	<2	<5	17	14	<2	<2	<5	21	<2	<2	<2	45	<2	<2	<5	--	--
Lithium	ug/L	19	<5	6.8	16	37	<5	6.1	46	10	<5	9.9	32	21	<5	7.1	29	28	<5	9.7	50	--	--
Manganese	ug/L	3	12.9	71	390	61	<2	7.8	416	15	<2	33	354	20	<2	<2	81.2	37	<2	12.5	385	--	50
Mercury	ug/L	19	<1	<1	<1	79	<1	<1	<1	15	<1	<1	<1	21	<1	<1	<1	46	<1	<1	<1	2	--
Molybdenum	ug/L	19	<5	<5	27	37	<5	<5	19	10	<5	<5	14	21	<5	<5	<5	28	<5	<5	21	--	--
Nickel	ug/L	3	<2	2.48	6.22	57	<2	2.54	3.08	15	<2	2.55	3.79	20	<2	3.16	14	38	<2	2.47	6.82	100	--
Selenium	ug/L	19	<5	<5	<5	79	<5	<5	6	15	<5	<5	<5	21	<5	<5	9	46	<5	<5	<5	50	--
Silver	ug/L	19	<2	<2	<2	78	<2	<2	<10	14	<2	<2	<10	21	<2	<2	<2	45	<2	<2	<10	--	100
Thallium	ug/L	19	<1	<1	<1	79	<1	<1	<1	15	<1	<1	<1	21	<1	<1	<1	47	<1	<1	<1	2	--
Vanadium	ug/L	19	<3	<3	4.5	37	<3	<3	8	10	<3	<3	8.2	21	<3	<3	13	28	<3	<3	11	--	--
Zinc	ug/L	19	<10	<10	100	78	<10	<50	760	14	<10	<10	<50	21	<10	<10	38.5	45	<50	23	270	--	5,000

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Dept. of Public Health (CDPH).

Only wells with known construction information are presented in this table. CDPH wells are assumed to represent the principal zone if no construction information is available as these are typically deep wells.

1. mg/L = milligrams per liter; ug/L = micrograms per liter; MFL = million fibers per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results in 2012 for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results reported at multiple reporting limits, the median was computed using the Maximum Likelihood Estimate (MLE) method. In these cases, the upper bound of the estimate is presented.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per CDPH or US EPA. For SMCLs having a range, the lower, recommended threshold is listed first with the upper threshold in parentheses.

Table B-3 Summary of 2012 Volatile Organic Compound (VOC) Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Level	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
1,1,1,2-Tetrachlorethane	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
1,1,1,Trichloroethane	ug/L	1	D	<0.5	69	D	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	200	--
1,1,2,2-Tetrachloroethane	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	1	--
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	ug/L	1	ND	<10	69	D	<10	5	ND	<10	0	NA	--	13	ND	<10	1,200	--
1,1,2-Trichloroethane	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	5	--
1,1-Dichloroethane	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	5	--
1,1-Dichloroethylene	ug/L	1	ND	<0.5	69	D	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	6	--
1,1-Dichloropropene	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
1,2,3-Trichlorobenzene	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
1,2,3-Trichloropropane	ug/L	0	NA	--	9	ND	<0.005	0	NA	--	0	NA	--	1	ND	<1	--	--
1,2,4-Trichlorobenzene	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	5	--
1,2,4-Trimethylbenzene	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
1,2-Dichlorobenzene	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	600	--
1,2-Dichloroethane	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	0.5	--
1,2-Dichloropropane	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	D	<0.5	5	--
1,3,5-Trimethylbenzene	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
1,3-Dichlorobenzene	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
1,3-Dichloropropane	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
1,3-Dichloropropene (Total)	ug/L	1	ND	<0.5	75	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	0.5	--
1,4-Dichlorobenzene	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	5	--
1-Phenylpropane (N-Propylbenzene)	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
2,2-Dichloropropane	ug/L	1	ND	<0.5	15	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
2,4-Dinitrotoluene	ug/L	0	NA	--	8	ND	<0.1	0	NA	--	0	NA	--	0	NA	--	--	--
2-Chlorotoluene	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
4-Chlorotoluene	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
Benzene	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	1	--
Benzo (A) Pyrene	ug/L	0	NA	--	15	ND	<0.1	4	ND	<0.1	0	NA	--	10	ND	<0.1	0.2	--
Bromobenzene	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
Bromochloroacetic Acid (BCAA)	ug/L	0	NA	--	1	ND	<1	0	NA	--	0	NA	--	0	NA	--	--	--
Bromochloromethane	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
Bromodichloromethane (THM)	ug/L	1	ND	<1	24	ND	<1	0	NA	--	0	NA	--	12	ND	<1	--	--
Bromoform (THM)	ug/L	1	ND	<1	24	ND	<1	0	NA	--	0	NA	--	12	ND	<1	--	--
Bromomethane	ug/L	1	ND	<0.5	15	ND	<0.5	0	NA	--	0	NA	--	12	ND	<1	--	--
Carbon Disulfide	ug/L	1	ND	<0.5	9	ND	<0.5	0	NA	--	0	NA	--	0	NA	--	--	--
Carbon Tetrachloride	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	0.5	--
Chloroethane	ug/l	1	ND	<0.5	15	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
Chloroform (THM)	ug/l	1	ND	<1	24	ND	<1	0	NA	--	0	NA	--	12	ND	<1	--	--
Chloromethane	ug/l	1	ND	<0.5	15	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
Cis-1-2-Dichloroethylene	ug/l	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	6	--
Di(2-Ethylhexyl)Adipate	ug/l	0	NA	--	15	ND	<5	4	ND	<5	0	NA	--	10	ND	<5	400	--
Di(2-Ethylhexyl)Phthalate	ug/l	0	NA	--	15	ND	<3	4	ND	<3	0	NA	--	10	ND	<3	4	--
Dibromoacetic Acid (DBAA)	ug/l	0	NA	--	1	ND	<1	0	NA	--	0	NA	--	0	NA	--	--	--
Dibromochloromethane (THM)	ug/l	1	ND	<1	24	ND	<1	0	NA	--	0	NA	--	12	ND	<1	--	--
Dibromochloropropane (DBCP)	ug/l	0	NA	--	15	ND	<0.01	4	ND	<0.01	0	NA	--	11	ND	<0.01	0.2	--
Dibromomethane	ug/l	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
Dichloroacetic Acid (DCAA)	ug/l	0	NA	--	1	ND	<1	0	NA	--	0	NA	--	0	NA	--	--	--
Dichlorodifluoromethane (Freon 12)	ug/l	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
Dichloromethane (Methyl Chloride)	ug/l	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	5	--
Diisopropyl Ether	ug/l	1	ND	<3	15	ND	<3	0	NA	--	0	NA	--	12	ND	<3	--	--
Ethylbenzene	ug/l	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	300	--
Ethylene Dibromide (EDB)	ug/l	0	NA	--	15	ND	<0.02	4	ND	<0.02	0	NA	--	11	ND	<0.02	0.05	--
Ethyl-Tert-Butyl Ether	ug/l	1	ND	<3	15	ND	<3	0	NA	--	0	NA	--	12	ND	<3	--	--
HAA5 - Haloacetic Acids (HAA5)	ug/l	0	NA	--	1	ND	<2	0	NA	--	0	NA	--	0	NA	--	60	--
Hexachlorobutadiene	ug/l	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
Isopropylbenzene	ug/l	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--

Table B-3 Summary of 2012 Volatile Organic Compound (VOC) Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Level	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
Methyl Ethyl Ketone (MEK- Butanone)	ug/l	1	ND	<5	24	ND	<5	0	NA	--	0	NA	--	12	ND	<5	--	--
Methyl Isobutyl Ketone	ug/l	1	ND	<5	24	ND	<5	0	NA	--	0	NA	--	12	ND	<5	--	--
Methyl-Tert-Butyl-Ether (MTBE)	ug/l	1	ND	<3	71	ND	<3	5	ND	<3	0	NA	--	13	ND	<3	13	5
Monobromoacetic Acid (MBAA)	ug/l	0	NA	--	1	ND	<1	0	NA	--	0	NA	--	0	NA	--	--	--
Monochloroacetic Acid (MCAA)	ug/l	0	NA	--	1	ND	<2	0	NA	--	0	NA	--	0	NA	--	--	--
Monochlorobenzene	ug/l	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	70	--
M,P-Xylene	ug/l	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
Naphthalene	ug/l	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
N-Butylbenzene	ug/l	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
N-Nitrosodiethylamine(NDEA)	ng/l	18	D	<2	16	D	<2	8	ND	<2	20	D	<2	23	D	<2	--	--
N-Nitrosodimethylamine (NDMA)	ng/l	18	ND	<2	16	D	<2	8	ND	<2	20	D	<2	23	D	<2	--	--
N-Nitrosodi-n-Butylamine(NDBA)	ng/l	18	D	<2	16	D	<2	8	D	<2	20	D	<2	23	D	<2	--	--
N-Nitrosodi-n-Propylamine (NDPA)	ug/l	18	D	<2	16	D	<2	8	ND	<2	20	D	<2	23	D	<2	--	--
N-Nitrosomethylethylamine (NMEA)	ng/l	18	ND	<2	16	ND	<2	8	ND	<2	20	ND	<2	23	ND	<2	--	--
n-Nitrosopyrrolidine (NPYR)	ng/L	18	D	<2	16	ND	<2	8	ND	<2	20	ND	<2	23	ND	<2	--	--
o-Xylene	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
PCB-1016	ug/L	0	NA	--	8	ND	<0.5	4	ND	<0.5	0	NA	--	1	ND	<0.5	0.5	--
PCB-1221	ug/L	0	NA	--	8	ND	<0.5	4	ND	<0.5	0	NA	--	1	ND	<0.5	0.5	--
PCB-1232	ug/L	0	NA	--	8	ND	<0.5	4	ND	<0.5	0	NA	--	1	ND	<0.5	0.5	--
PCB-1242	ug/L	0	NA	--	8	ND	<0.5	4	ND	<0.5	0	NA	--	1	ND	<0.5	0.5	--
PCB-1248	ug/L	0	NA	--	8	ND	<0.5	4	ND	<0.5	0	NA	--	1	ND	<0.5	0.5	--
PCB-1254	ug/L	0	NA	--	8	ND	<0.5	4	ND	<0.5	0	NA	--	1	ND	<0.5	0.5	--
PCB-1260	ug/L	0	NA	--	8	ND	<0.5	4	ND	<0.5	0	NA	--	1	ND	<0.5	--	--
p-Isopropyltoluene	ug/L	1	ND	<0.5	9	ND	<0.5	0	NA	--	0	NA	--	1	ND	<0.5	--	--
Polychlorinated Biphenyls (Total PCBs)	ug/L	0	NA	--	13	ND	<0.5	4	ND	<0.5	0	NA	--	11	ND	<0.5	0.5	--
Sec-Butylbenzene	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
Styrene	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	100	--
Tert-Amyl-Methyl Ether	ug/L	1	ND	<3	15	ND	<3	0	NA	--	0	NA	--	12	ND	<3	--	--
Tert-Butyl Alcohol	ug/L	0	NA	--	6	ND	<2	0	NA	--	0	NA	--	12	ND	<2	--	--
Tert-Butylbenzene	ug/L	1	ND	<0.5	24	ND	<0.5	0	NA	--	0	NA	--	12	ND	<0.5	--	--
Tetrachloroethylene	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	D	<0.5	5	--
Toluene	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	150	--
Total Trihalomethanes	ug/L	1	ND	<0.5	10	D	<0.5	0	NA	--	0	NA	--	1	ND	<2	80	--
Trans-1,2-Dichloroethylene	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	10	--
Trichloroacetic Acid (TCAA)	ug/L	0	NA	--	1	ND	<1	0	NA	--	0	NA	--	0	NA	--	--	--
Trichloroethylene	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	5	--
Trichlorofluoromethane (Freon 11)	ug/L	1	ND	<5	69	ND	<5	5	ND	<5	0	NA	--	13	ND	<5	150	--
Vinyl Chloride	ug/L	1	ND	<0.5	69	ND	<0.5	5	ND	<0.5	0	NA	--	13	ND	<0.5	0.5	--
Xylenes (Total)	ug/L	1	ND	<0.5	67	ND	<0.5	5	ND	<0.5	0	NA	--	2	ND	<1	1,750	--

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Dept. of Public Health (CDPH). Only wells with known construction information are presented in this table. CDPH wells are assumed to represent the principal zone if no construction information is available as these are typically deep wells.

1. ug/L = micrograms per liter; ng/L = nanograms per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results in 2012 for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. ND= not detected above laboratory reporting limit. NA = not analyzed. D = detection above reporting limit.
6. RL = Laboratory reporting limit. In the case of multiple reporting limits, the highest limit is shown.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per CDPH or US EPA.

Table B-4 Summary of 2012 Volatile Organic Compound (VOC) Detections

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin Coyote Valley				Llagas Subbasin								Maximum Contaminant Level	
		Shallow Zone[2]				Principal Zone[3]								Shallow Zone				Principal Zone					
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
1,1,1-Trichloroethane	ug/L	1	0.9	0.9	0.9	69	<0.5	<0.5	3.3	5	<0.5	<0.5	<0.5	0	--	--	--	13	<0.5	<0.5	<0.5	200	--
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	ug/L	1	<10	<10	<10	69	<10	<10	13	5	<10	<10	<10	0	--	--	--	13	<10	<10	<10	1,200	--
1,1-Dichloroethylene	ug/L	1	<0.5	<0.5	<0.5	69	<0.5	<0.5	5.2	5	<0.5	<0.5	<0.5	0	--	--	--	13	<0.5	<0.5	<0.5	6	--
1,2-Dichloropropane	ug/L	1	<0.5	<0.5	<0.5	69	<0.5	<0.5	<0.5	5	<0.5	<0.5	<0.5	0	--	--	--	13	<0.5	<0.5	1.1	5	--
n-Nitrosodimethylamine (NDMA)	ng/L	18	<2	<2	<2	16	<2	<2	<2	8	<2	<2	<2	20	<2	<2	<2	23	<2	<2	2.1	--	--
n-Nitrosodi-n-Butylamine (NDBA)	ng/L	18	<2	<2	5.7	16	<2	<2	4.1	8	<2	<2	2.3	20	<2	<2	3.4	23	<2	<2	6.2	--	--
Tetrachloroethylene	ug/L	1	<0.5	<0.5	<0.5	69	<0.5	<0.5	<0.5	5	<0.5	<0.5	<0.5	0	--	--	--	13	<0.5	<0.5	2	5	--
Total Trihalomethanes	ug/L	1	<0.5	<0.5	<0.5	10	<0.5	<0.5	0.8	0	--	--	--	0	--	--	--	1	<2	<2	<2	80	--

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Dept. of Public Health (CDPH).

Only wells with known construction information are presented in this table. CDPH wells are assumed to represent the principal zone if no construction information is available as these are typically deep wells.

1. ug/L = micrograms per liter; ng/L = nanograms per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results in 2011 for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results reported at multiple reporting limits, the median was computed using the Maximum Likelihood Estimate (MLE) method. In these cases, the upper bound of the estimate is presented.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per CDPH or US EPA.

Table B-5 Summary of 2012 Pesticide Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Level	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
2,3,7,8-TCDD (Dioxin)	ug/L	0	NA	--	15	ND	<0.000005	8	ND	<0.000005	0	NA	--	19	ND	<0.000005	0.00003	--
2,4,5-TP (Silvex)	ug/L	0	NA	--	15	ND	<1	8	ND	<1	0	NA	--	19	ND	<1	50	--
2,4-D	ug/L	0	NA	--	15	ND	<10	8	ND	<10	0	NA	--	19	ND	<10	70	--
3-Hydroxycarbofuran	ug/L	0	NA	--	9	ND	<3	4	ND	<3	0	NA	--	20	ND	<3	--	--
Acifluorfen	ug/L	0	NA	--	0	NA	--	0	NA	--	0	NA	--	1	ND	<0.5	--	--
Alachlor	ug/L	0	NA	--	15	ND	<1	8	ND	<1	0	NA	--	21	ND	<1	2	--
Aldicarb	ug/L	0	NA	--	9	ND	<3	4	ND	<3	0	NA	--	20	ND	<3	--	--
Aldicarb Sulfone	ug/L	0	NA	--	9	ND	<4	4	ND	<4	0	NA	--	20	ND	<4	--	--
Aldicarb Sulfoxide	ug/L	0	NA	--	9	ND	<3	4	ND	<3	0	NA	--	20	ND	<3	--	--
Aldrin	ug/L	0	NA	--	10	ND	<0.075	4	ND	<0.075	0	NA	--	20	ND	<0.075	--	--
Atrazine	ug/L	0	NA	--	15	ND	<0.5	8	ND	<0.5	0	NA	--	20	ND	<0.5	1	--
Bentazon	ug/L	0	NA	--	15	ND	<2	8	ND	<2	0	NA	--	19	ND	<2	18	--
Bromacil	ug/L	0	NA	--	10	ND	<10	4	ND	<10	0	NA	--	19	ND	<10	--	--
Butachlor	ug/L	0	NA	--	10	ND	<0.38	4	ND	<0.38	0	NA	--	19	ND	<0.38	--	--
Carbaryl	ug/L	0	NA	--	9	ND	<5	4	ND	<5	0	NA	--	20	ND	<5	--	--
Carbofuran	ug/L	0	NA	--	14	ND	<5	8	ND	<5	0	NA	--	21	ND	<5	18	--
Chlordane	ug/L	0	NA	--	15	ND	<0.1	8	ND	<0.1	0	NA	--	21	ND	<0.1	0.1	--
Chlorothalonil	ug/L	0	NA	--	2	ND	<5	4	ND	<5	0	NA	--	19	ND	<5	--	--
Cis-1,3-Dichloropropene	ug/L	1	ND	<0.5	21	ND	<0.5	0	NA	--	0	NA	--	40	ND	<0.5	0.5	--
Dalapon	ug/L	0	NA	--	15	ND	<10	8	ND	<10	0	NA	--	19	ND	<10	200	--
DCPA (Total Di & Mono Acid Degradates)	ug/L	0	NA	--	8	ND	<0.1	0	NA	--	0	NA	--	0	NA	--	--	--
Diazinon	ug/L	0	NA	--	8	ND	<0.1	0	NA	--	0	NA	--	0	NA	--	--	--
Dicamba	ug/L	0	NA	--	10	ND	<1.5	4	ND	<1.5	0	NA	--	18	ND	<1.5	--	--
Dieldrin	ug/L	0	NA	--	10	ND	<0.02	4	ND	<0.02	0	NA	--	20	ND	<0.02	--	--
Dimethoate	ug/L	0	NA	--	8	ND	<0.1	0	NA	--	0	NA	--	0	NA	--	--	--
Dinoseb	ug/L	0	NA	--	15	ND	<2	8	ND	<2	0	NA	--	19	ND	<2	7	--
Diquat	ug/L	0	NA	--	14	ND	<4	8	ND	<4	0	NA	--	20	ND	<4	20	--
Endothall	ug/L	0	NA	--	14	ND	<45	8	ND	<45	0	NA	--	20	ND	<45	100	--
Endrin	ug/L	0	NA	--	15	ND	<0.1	8	ND	<0.1	0	NA	--	21	ND	<0.1	2	--
Gamma-BHC (Lindane)- Total	ug/L	0	NA	--	15	ND	<0.2	8	ND	<0.2	0	NA	--	20	ND	<0.2	0.2	--
Glyphosate	ug/L	0	NA	--	14	ND	<25	8	ND	<25	0	NA	--	21	ND	<25	700	--
Heptachlor	ug/L	0	NA	--	15	ND	<0.01	8	ND	<0.01	0	NA	--	21	ND	<0.01	0.01	--
Heptachlor Epoxide	ug/L	0	NA	--	15	ND	<0.01	8	ND	<0.01	0	NA	--	21	ND	<0.01	0.01	--
Hexachlorobenzene	ug/L	0	NA	--	15	ND	<0.5	8	ND	<0.5	0	NA	--	21	ND	<0.5	1	--
Hexachlorocyclopentadiene	ug/L	0	NA	--	15	ND	<1	8	ND	<1	0	NA	--	20	ND	<1	50	--
Methiocarb	ug/L	0	NA	--	8	ND	<0.5	0	NA	--	0	NA	--	1	ND	<2	--	--
Methomyl	ug/L	0	NA	--	9	ND	<2	4	ND	<2	0	NA	--	20	ND	<2	--	--
Methoxychlor	ug/L	0	NA	--	15	ND	<10	8	ND	<10	0	NA	--	21	ND	<10	30	--
Metolachlor	ug/L	0	NA	--	8	ND	<0.05	0	NA	--	0	NA	--	0	NA	--	--	--
Metribuzin	ug/L	0	NA	--	8	ND	<0.05	0	NA	--	0	NA	--	0	NA	--	--	--
Molinate	ug/L	0	NA	--	15	ND	<2	8	ND	<2	0	NA	--	20	ND	<2	20	--
Oxamyl	ug/L	0	NA	--	14	ND	<20	8	ND	<20	0	NA	--	21	ND	<20	50	--
Pentachlorophenol	ug/L	0	NA	--	15	ND	<0.2	8	ND	<0.2	0	NA	--	19	ND	<0.2	1	--
Picloram	ug/L	0	NA	--	15	ND	<1	8	ND	<1	0	NA	--	19	ND	<1	500	--
Prometryn	ug/L	0	NA	--	1	ND	<2	0	NA	--	0	NA	--	0	NA	--	--	--
Propachlor	ug/L	0	NA	--	10	ND	<0.5	4	ND	<0.5	0	NA	--	19	ND	<0.5	--	--
Propoxur	ug/L	0	NA	--	8	ND	<0.5	0	NA	--	0	NA	--	1	ND	<2	--	--
Simazine	ug/L	0	NA	--	15	ND	<1	8	ND	<1	0	NA	--	20	ND	<1	4	--
Thiobencarb	ug/L	0	NA	--	15	ND	<1	8	ND	<1	0	NA	--	20	ND	<1	70	1
Toxaphene	ug/L	0	NA	--	15	ND	<1	8	ND	<1	0	NA	--	21	ND	<1	3	--
Trans-1,3-Dichloropropene	ug/L	1	ND	<0.5	21	ND	<0.5	0	NA	--	0	NA	--	40	ND	<0.5	--	--

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Dept. of Public Health (CDPH).

Only wells with known construction information are presented in this table. CDPH wells are assumed to represent the principal zone if no construction information is available as these are typically deep wells.

1. ug/L = micrograms per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results in 2012 for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. ND= not detected above laboratory reporting limit. NA = not analyzed. D = detection above reporting limit.
6. RL = Laboratory reporting limit. In the case of multiple reporting limits, the highest limit is shown.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per CDPH or US EPA

Table B-6 Summary of 2012 Radioactive Constituent Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley				Llagas Subbasin								Maximum Contaminant Level	
		Shallow Zone[2]				Principal Zone[3]								Shallow Zone				Principal Zone					
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
Gross Alpha	pCi/L	15	<1.5	4.8	16	53	<0.57	1.49	6	14	<1.32	2.45	5.5	20	<1.53	3.4	12	30	<1.16	2.81	9	15	--
Gross Alpha Counting Error	pCi/L	15	0.312	2.42	4.3	53	0.16	2.3	3.6	14	0.562	1.6	3	21	0.46	2.6	3.4	30	0.156	2.7	4.7	--	--
Gross Beta	pCi/L	15	<1.5	8.2	21	37	<1.3	2.2	31	10	<1.3	<3	<3	20	<1.4	<3	<3	28	<1.2	2.7	13	4[9]	--
Gross Beta Counting Error	pCi/L	15	0.75	1.4	57.9	37	0.51	1.1	8.51	10	0.75	1.19	1.4	21	0.82	1.2	3.24	28	0.75	1.15	2.6	--	--
Radium 228	pCi/L	0	--	--	--	0	--	--	--	4	0.22	0.5	1.3	0	--	--	--	1	0.27	2.7	0.27	5[10]	--
Radium 228 Counting Error	pCi/L	0	--	--	--	0	--	--	--	4	0.47	0.5	0.52	0	--	--	--	1	0.44	0.44	0.44	--	--
Gross Alpha + Adjusted Error	pCi/L	6	<3	3.75	20	22	<3	<3	8.5	6	3	3	8	13	3	6	10	21	3	3	10	--	--
Gross Alpha MDA95	pCi/L	15	1.16	1.88	3.6	51	0.01	3	3.5	14	1.32	2.5	3	21	1.32	3	3.3	30	1.16	3	4.5	--	--
Radium 288 MDA95	pCi/L	0	--	--	--	0	--	--	--	4	0.76	0.77	0.82	0	--	--	--	1	0.72	0.72	0.72	--	--
Gross Beta MDA95	pCi/L	15	1.36	3	105	37	0.72	3	12.9	10	1.26	3	3	21	1.15	3	3	28	1.1	3	3	--	--

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Dept. of Public Health (CDPH).

Only wells with known construction information are presented in this table. CDPH wells are assumed to represent the principal zone if no construction information is available as these are typically deep wells.

1. pCi/l = picocuries per liter; mrem/yr = millirem per year.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results in 2012 for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results reported at multiple reporting limits, the median was computed using the Maximum Likelihood Estimate (MLE) method. In these cases, the upper bound of the estimate is presented.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per CDPH or US EPA.
9. Gross beta has an MCL of 4 mrem/yr, but is reported in units of pCi/L. The CA Dept. of Public Health requires additional testing by public water systems when gross beta is above 50 pCi/L.
10. The MCL is 5 pCi/L for radium-226 and radium-228 combined.

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Water District

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